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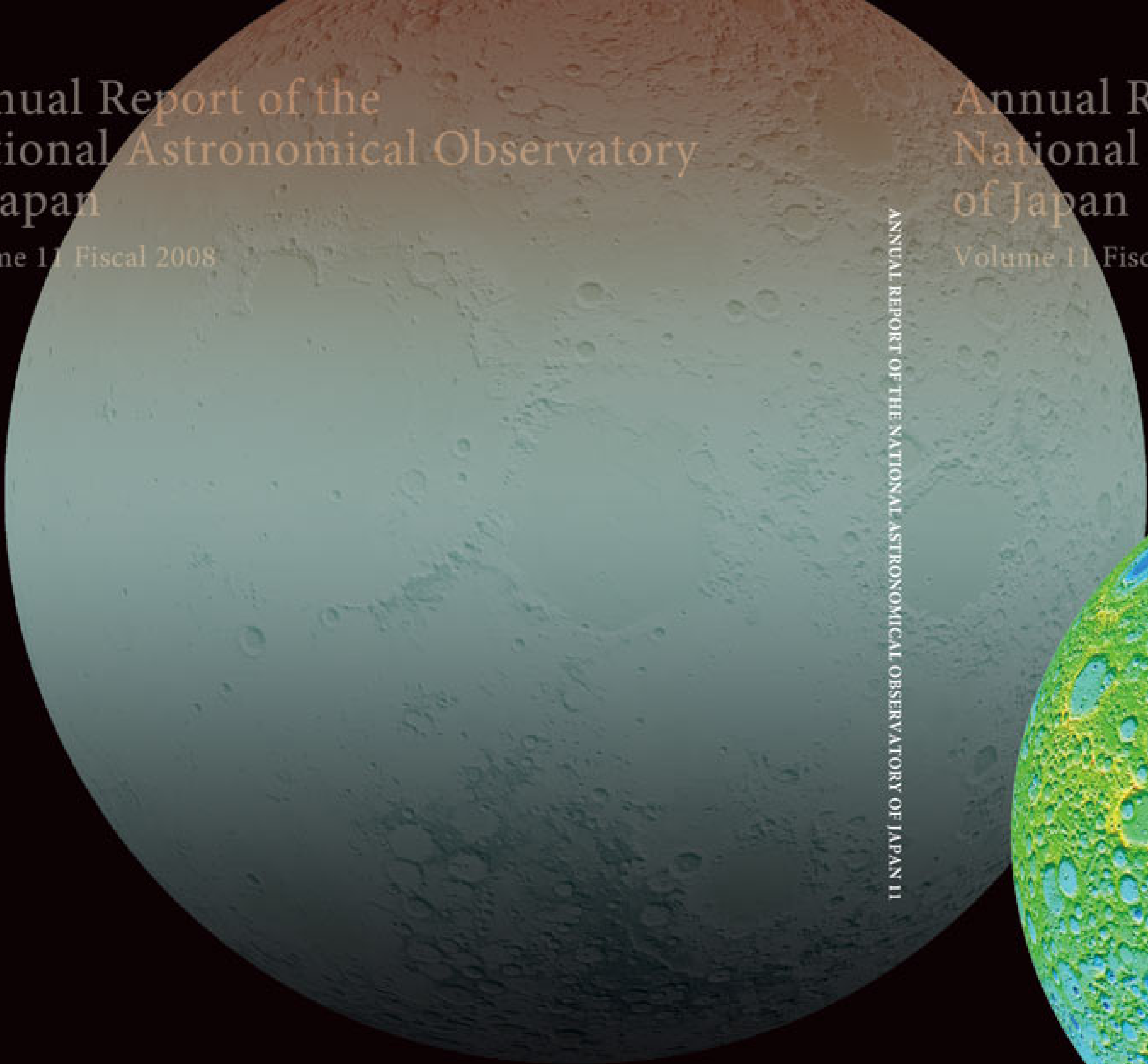

Annual Report of the National Astronomical Observatory of Japan

Volume 11 Fiscal 2008

ANNUAL REPORT OF THE NATIONAL ASTRONOMICAL OBSERVATORY OF JAPAN 11

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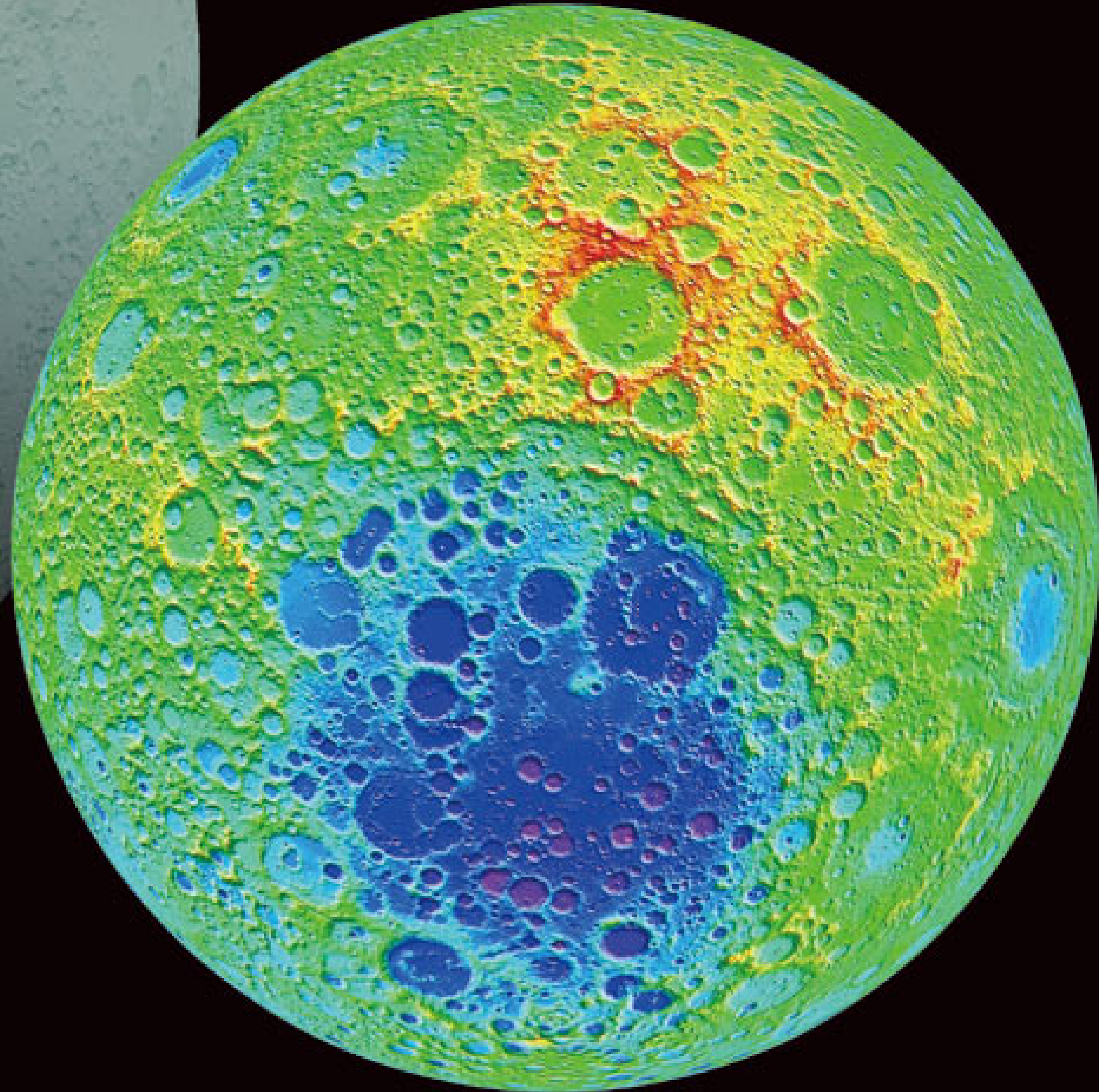

Cover Caption

Lunar topographic map derived from KAGUYA laser altimeter LALT (NAOJ/JAXA/SELENE).
South Pole-Aitken basin is spread over the lunar far side.

Postscript

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P R E F A C E

Shoken MIYAMA
Director General of NAOJ

We are pleased to present the Annual Report of the National Astronomical Observatory of Japan (NAOJ) for fiscal 2008.

This year marked the 20th anniversary of the establishment of NAOJ, and we held a commemorative ceremony in November 2008. For the last 20 years, many observation facilities (such as Subaru Telescope) have been completed and they are now achieving remarkable results.

Over the last two decades, there were various findings in astronomy that brought us new insights and contributed to astronomical advancement. In 1995, researchers of Switzerland discovered a planet circling a star outside the solar system incidentally when observing a primary star. It turned out that this planet is orbiting around Pegasus 51 in an about four-day period and has a mass roughly a half of Jupiter's mass. Though the observed planetary system is quite different from our solar system, this discovery marked the beginning of similar observations which led to discoveries of more than 300 planets.

After this discovery, astronomers began to focus on three major targets:

(1) Direct imaging of planets outside the solar system;

(2) Exploration of the origin of diverse solar systems and reconstruction of conventional planet formation theory; and

(3) Search for life in planets outside the solar system.

In connection with the target (1), a Canada-US research team announced that they identified three potential planets around a primary star using the Gemini telescope and W.M. Keck Observatory in Hawaii, and found out that these potential planets are undoubtedly orbiting around the primary star by comparing two images taken this time and a few years ago. However, it seems to be difficult to estimate the mass of the potential planets from pictures and thus it is still controversial whether the mass of the potential planet is less than 13 times the Jupiter's mass, which is regarded as an essential qualification for a "planet" (the definition of planet defined by AIU does not apply to planets outside the solar system). Subaru Telescope will also start observation with advanced AO (Adaptive Optics) and HiCIAO (High Contrast Instrument for the Subaru next generation Adaptive Optics: a new stellar coronagraph) aiming for direct observation of planets outside the solar system.

For the target (2), researchers are actively working on theoretical studies to investigate the diversity of planets and their formation process. In theoretical simulation, more detailed calculation has become possible. The GRAPE system was a special-purpose computer system for astrophysical many-body simulations at the beginning, but it has evolved to a new general-purpose system called GRAPE-DR. It is expected that this new system will enable us to study planet formation under a wide range of initial conditions by performing calculation of N bodies around the Sun.

Meanwhile, initial conditions of planetary formation may be clearly defined by ALMA (Atacama Large Millimeter/submillimeter Array) under construction in Chile. ALMA is capable of analyzing details of a gas disk (primordial solar system disk) formed around a young star in a nearby star- forming region. By performing numerical simulation using the initial conditions derived from the structure of a gas disk, we may be able to figure out the formation process of planets in our solar system and the diversity of planetary systems.

It has been five years since the start of the ALMA Project, which will be completed over eight years. At the construction site in Chile, test observations have been conducted with antennas delivered from Japan, and the Japanese antennas proved their high performance and capability. As for other ALMA subsystems, we successfully developed a submillimeter receiver called "Band 10" covering the highest frequency band in ALMA, and confirmed that it meets extremely high requirements of ALMA. This achievement proved that the receiver developed by NAOJ has the world's highest capability in this frequency band.

The target (3) "Search for life in planets outside the solar system" is a medium-term objective in the future. Even if Subaru Telescope could obtain direct images of some planets outside the solar system with its advanced equipment, such images would be limited to those of gas-giant planets with the size of Jupiter because small rocky stars like the earth are difficult to be observed due to its darkness. On the other hand, indirect observation of habitable planets may become possible by introducing a high-resolution spectroscope. Generally speaking, in case of a Sun-like star, habitable planets (where a large amount of liquid water exists) are supposed to have orbits in a distance equivalent to the distance from the Sun to the Earth. If they are in such a distant region, current spectroscopes are unable to detect oscillations of the central star. In case of an M-type star (whose mass is less than a half of the Sun) with surface temperature much lower than that of the Sun, its habitable zone would be much closer to the central star. If there is an Earth-like planet within such a close habitable zone, oscillations of the central star would be larger due to closer distance and smaller mass ratio between the central star and the planet. Given this, if there is a habitable planet around an M-type star, it may be indirectly observed by Subaru Telescope.

Furthermore, if any future 30-meter telescope (such as TMT) can successfully observe a habitable planet blocking the front of the central star, we may be able to analyze atmospheric components of the planet: oxygen molecules suggest the existence of plants, and methane suggests the existence of animals. We expect that great mysteries of mankind will be solved within the next 10 years.

To address these big challenges, there is nothing more important than nurturing young researchers. NAOJ is opening positions to researchers every year. Researches are employed through open recruitment from the public or through recommendation from each project, and currently about 50 researchers are working at NAOJ. And we are also providing research guidance for many graduate students (currently 50 students are accepted) mainly from the Graduate University for Advanced Studies. We hope some of these students will be astronomers who work on the astronomical hottest themes that are now earnestly explored by researchers all over the world, such as planetary formation, planetary exploration, and search for life in the universe.

Compared to last year, this year's report contains a lot more achievements in observational astronomy, theoretical astronomy, equipment development, and engineering development focused on research targets other than those listed above. Astronomy has continuously made enormous and rapid progress. We appreciate your continued support for the growth of astronomy and our activities.

Shoken Miyama

Shoken MIYAMA
Director General of NAOJ

I Scientific Highlights

(April 2008 – March 2009)

Vega's Rotational Velocity Determined from Spectral Line Profiles

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Although Vega (A0V) has long been well known for its sharp-line nature with a low projected rotational velocity ($v_e \sin i \sim 20\,\mathrm{km\,s^{-1}}$), we now believe that it is a rapidly rotating star seen nearly pole-on. This evidence came from studying the characteristic flat-bottom profiles of spectral lines, which were first discovered by [1] based on the ultra-high *S/N* spectrum and successively analyzed in detail by [2] and [3] to determine (v_e, i) separately, since they may contain information on rotation-induced gravity darkening. Furthermore, this fact has recently been confirmed also by interferometric observations ([4], [5]), by which the rotation-induced darkening on the stellar disk may be directly studied.

Unfortunately, from a quantitative point of view, consensus has not yet been reached regarding how fast Vega is actually rotating, since the (v_e, i) results derived so far do not necessarily agree, which diverge into low scale v_e (~160 − 170 km s^{-1}; [3]) and high scale v_e (~250 − 270 km s^{-1}; [4, 5]). In order to shed light on this confusing situation while establishing its absolute rotational velocity independently by ourselves, we decided to carry out an extensive line profile study based on the very high-*S/N* (~1000 − 3000) and high-resolution (R ~ 100000) spectrum data we have recently published ([6]).

Regarding the modeling of a rapidly-rotating star, we made the following assumptions:

(1) Point-mass potential (Roche model).
(2) Axially-symmetric uniform rotation.
(3) Stellar shape of equipotential surface.
(4) Local T_{eff} depends upon g_{eff} as $T_{\mathrm{eff}} \propto g_{\mathrm{eff}}^{\beta}$, ($\beta \simeq 0.25$).

A total of six model parameters are involved in our modeling: M (mass), [X/H] (metallicity), v_e (equatorial rotation velocity), i (inclination angle), R_p (polar radius), and $T_{\mathrm{eff,p}}$ (polar effective temperature). However, we could reduce the number of degrees of freedom to one (only v_e) by adequately assuming M ($2.3\,M_\odot$) and [X/H] (−0.5 dex), by the constraint of $v_e \sin i = 22\,\mathrm{km\,s^{-1}}$ (a reasonable value seen from recent determinations) and by the requirement of absolute spectral energy distribution (SED), resulting in a sequence of candidate models [$i(v_e)$, $R_p(v_e)$, $T_{\mathrm{eff,p}}(v_e)$] parameterized by v_e.

Then, by comparing the observed profiles of carefully selected sufficiently weak lines with the theoretical profiles (computed for various v_e; see, e.g., Figure 1), we determined the best-fit v_e value for each line. Finally, the best solution was concluded to be $v_e = 175\,\mathrm{km\,s^{-1}}$, which further gives $i = 7^\circ\!.2$, $R_p = 2.52\,R_\odot$, and $T_{\mathrm{eff,p}} = 9867$ K. Comparing these with the results of the previous studies, we see that our v_e solution is near to Hill et al.'s spectroscopic result (~160 km s^{-1}; [3]), while it is significantly discrepant from the conclusions of recent interferometric determinations (~270 km s^{-1}; [4, 5]).

The complete procedures of our analysis and in-depth discussions of the results are described in [7].

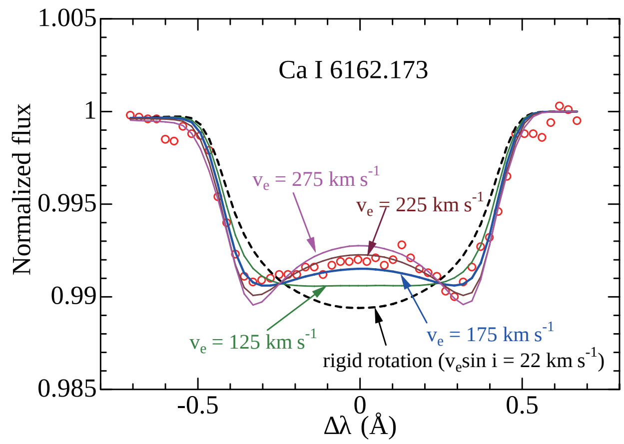

Figure 1: Example of line-profile fitting. Symbols: observed profile; lines: computed profiles with different v_e.

References

[1] Gulliver, A.F., et al.: 1991, *ApJ*, **380**, 223.
[2] Gulliver, A.F., et al.: 1994, *ApJL*, **429**, L81.
[3] Hill, G., et al.: 2004, in *The A-Star Puzzle* (Proc. IAU Symp. 224), ed. J. Zverko, J. Žižňovský, S. J. Adelman, W. W. Weiss (Cambridge: Cambridge University Press), 35.
[4] Peterson, D.M., et al.: 2006, *Nature*, **440**, 896.
[5] Aufdenberg, J.P., et al.: 2006, *ApJ*, **645**, 664 (erratum: **651**, 617).
[6] Takeda, Y., et al.: 2007, *PASJ*, **59**, 245.
[7] Takeda, Y., et al.: 2008, *ApJ*, **678**, 446. 1.

Observations of 1999 YC and the Breakup of the Geminid Stream Parent

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Apollo asteroid 1999 YC may share a dynamical association with the Phaethon-Geminid stream complex. Here, we present photometric observations taken to determine the physical properties of 1999 YC.

The object shows a nearly neutral reflection spectrum, similar to but slightly redder than related objects 3200 Phaethon and 2005 UD (Fig. 1). Assuming an albedo equal to 3200 Phaethon's we find that the diameter is 1.4+/−0.1 km. Time-resolved broad-band photometry yields a double-peaked rotational period of 4.4950+/− 0.0010 hr while the range of the lightcurve indicates an elongated shape having a projected axis ratio near 1.9:1 (Fig. 2). Surface brightness models provide no evidence of lasting mass loss of the kind seen in active short period cometary nuclei [1].

An upper limit to the mass loss is set at about 0.001 kg/s, corresponding to an upper limit on the fraction of the surface that could be sublimating water ice of 0.001. If sustained over the 1000 yr age of the Geminid stream, the total mass loss from 1999 YC (3e7 kg) would be small compared to the reported stream mass (1e12 – 1e13 kg), suggesting that the stream is the product of catastrophic, rather than steady-state, breakup of the parent object [1].

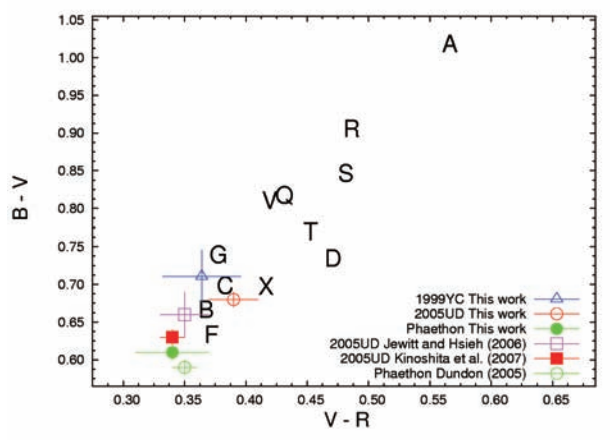

Figure 1: Color plots of V − R vs. B − V for PGC and near-Earth asteroids within various Tholen taxonomic classes.

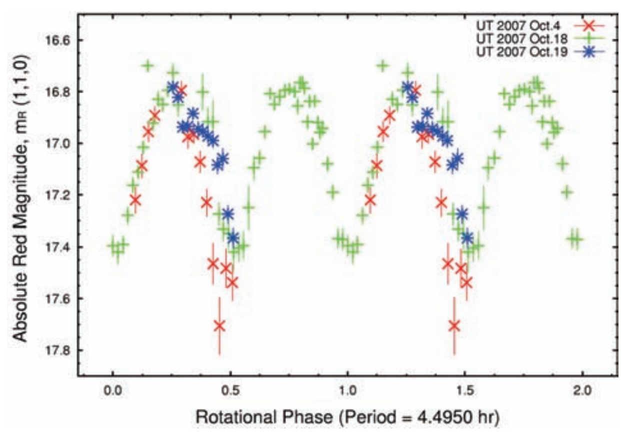

Figure 2: Rotational phase vs. absolute red magnitude variation of 1999 YC observed on UT 2007 October 4, 18, and 19. mR(1, 1, 0) is phased to the double-peaked rotational period of P_{rot} = 4.4950 ± 0.0010 h.

Reference

[1] Kasuga, T., Jewitt, D.: 2008, *AJ*, **136**, 881.

Systematic infrared 2.5 − 5 μm spectroscopy of nearby ultraluminous infrared galaxies: Buried AGNs as a function of galaxy infrared luminosity

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OI, Nagisa (GUAS/NAOJ)
NAKAGAWA, Takao, OHYAMA, Yoichi, SHIRAHATA, Mai, WADA, Takehiko (ISAS/JAXA)

Ultraluminous infrared galaxies (ULIRGs) radiate the bulk of their large luminosities (>$10^{12} L_\odot$) as infrared emission. This means that (1) very luminous energy sources are present hidden behind dust, (2) the bulk of the energetic radiation from the hidden energy sources is once absorbed by the surrounding dust, and (2) the heated dust emits strong infrared radiation. The energy source can be nuclear fusion inside rapidly formed stars (starburst) and/or active mass accretion onto a central supermassive blackhole (AGN). Distinguishing the hidden energy sources of ULIRGs is indispensable not only to understand the true nature of the ULIRG population, but also to unveil the history of star-formation and supermassive blackhole growth in the dust-obscured portion of the universe.

Since AGN activity is spatially very compact, it can easily be *buried* (= obscured in virtually all directions) in dusty ULIRG's cores. Unlike an AGN surrounded by torus-shaped dusty medium, which is easily detectable through optical spectroscopy, such *buried* AGNs are very difficult to find. However, detecting *buried* AGNs and estimating their energetic role are the most important issue in the current ULIRG study. For this purpose, observations at wavelengths of low dust extinction are necessary, and infrared 3 − 4 μm (rest-frame) spectroscopy is an effective means. First, PAH (polycyclic aromatic hydrocarbon) emission features, found at 3.3 μm (rest-frame), are detected in starburst galaxies, but not in AGNs, because of the destruction of PAHs. Hence, the presence or absence of the PAH emission can be used to identify the energy sources. Next, in a normal starburst, where the stellar energy sources and dust are spatially well mixed, there is an upper limit for the optical depth of dust absorption features found at 3 − 4 μm, while it can be arbitrarily large in a buried AGN, where the energy source is more centrally concentrated than the surrounding dust [1].

Using the Subaru telescope, we have so far performed systematic infrared 2.8 − 4.1 μm spectroscopy of ULIRGs at z < 0.15, and found luminous buried AGN signatures in a significant fraction of the observed ULIRGs [1]. AKARI satellite has spectroscopic capability at 2.5 − 5 μm, unaffected by Earth atmosphere, as well as sufficient sensitivity to obtain high quality spectra of ULIRGs at z < 0.3 in a short exposure time. By extending our study to more distant ULIRGs at z > 0.15 (Figure 1), many ULIRGs with higher infrared luminosities are included. We can thus investigate the detected buried AGN fraction as a function of galaxy infrared luminosity. We found that with increasing galaxy infrared luminosity, buried AGNs become *relatively* important energetically, but the remaining star-formation-originating luminosities are also higher (i.e., a star formation rate is higher and more stars will be formed). Buried AGNs can have a particularly strong feedback to the surrounding gas and dust in host galaxies. Our results may observationally support the widely-proposed AGN feedback scenario as the origin of the galaxy downsizing phenomenon [2], where more massive galaxies with currently larger stellar masses have finished their major star-formation in an early cosmic age on a shorter time scale.

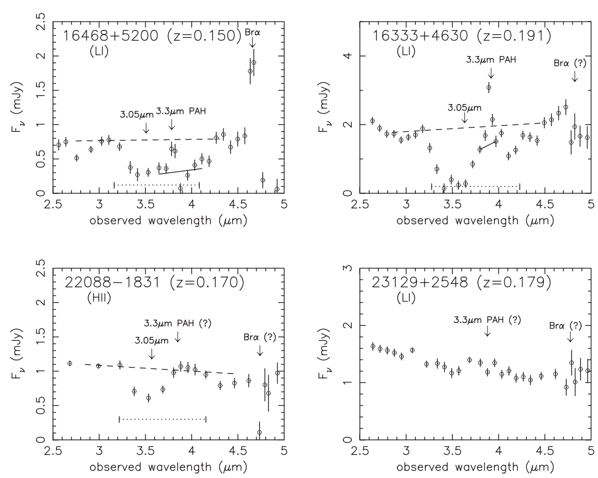

Figure 1: Examples of AKARI 2.5 − 5 μm spectra of ULIRGs at z = 0.15 − 0.3. All ULIRGs show low-equivalent-width PAH emission and/or strong dust absorption features, suggesting that buried AGNs are energetically important. The 3.05 μm absorption feature is due to ice-covered dust grains. Dashed lines mean continuum levels. Dotted lines indicate the wavelength range where the 3.05 μm ice absorption feature is strong. HII, LI mean ULIRGs optically classified as HII-regions and LINERs, respectively.

References

[1] Imanishi, M., et al.: 2006, *ApJ*, **637**, 114.
[2] Imanishi, M., et al.: 2008, *PASJ*, **60**, S489.

Nobeyama Millimeter Array HCN(J=1–0) and HCO$^+$(J=1–0) observations of luminous infrared galaxies: The final sample

IMANISHI, Masatoshi, NAKANISHI, Kouichiro, (NAOJ)
TAMURA, Yoichi (Univ. of Tokyo/NAOJ)
PENG, Chih-Han (GUAS/NAOJ)

Luminous infrared galaxies radiate very large luminosities ($>10^{11} L_\odot$) as infrared dust emission, suggesting that powerful energy sources (starburst and/or AGN) are present, surrounded by dust. Unlike AGNs obscured by torus-shaped dusty medium, putative AGNs in LIRG's nuclei are likely to be obscured by a large amount of dust and gas in all directions (= buried), making the identification of AGNs difficult.

In an AGN, X-ray emission (E > 2 keV) is strong and an emission surface brightness is high, compared to a starburst. In the case of a buried AGN at a LIRG's nucleus, we may be able to detect these AGN signatures, through the effects to the surrounding gas and dust. In fact, observationally, the brightness-temperature ratios of HCN(J=1–0) and HCO$^+$(J=1–0) emission lines at $\lambda \sim 3.4$ mm ($\nu \sim 89$ GHz) are different between weakly-obscured AGN-dominated galaxy nuclei and starburst galaxies. Through the systematic observations of LIRGs, using the Nobeyama Millimeter Array (NMA), we have found that LIRGs with luminous buried AGN signatures in infrared spectra tend to show high HCN(J=1–0)/HCO$^+$(J=1–0) brightness-temperature ratios, as seen in weakly-obscured AGNs. However, our sample of buried AGN candidates has been limited to sources with very high infrared luminosities ($>10^{12} L_\odot$), so that a scenario without invoking an AGN (e.g., different molecular gas properties in galaxies with different luminosities) has been proposed to explain the high ratios.

In this paper, we have observed four LIRGs (five nuclei) of moderate infrared luminosities ($<10^{12} L_\odot$), with or without buried AGN signatures at other wavelengths (Figure 1), and confirmed that those with AGN signatures still show high ratios (Figure 2), reinforcing that the buried AGN scenario (not different molecular gas properties scenario) is at work [1]. The high ratios could be explained by an HCN abundance enhancement in an AGN, due to strong X-rays, or infrared radiative pumping of HCN molecules by hot dust heated by an AGN (= a high emission surface brightness energy source). Sophisticated theoretical models are needed to properly interpret our observational results.

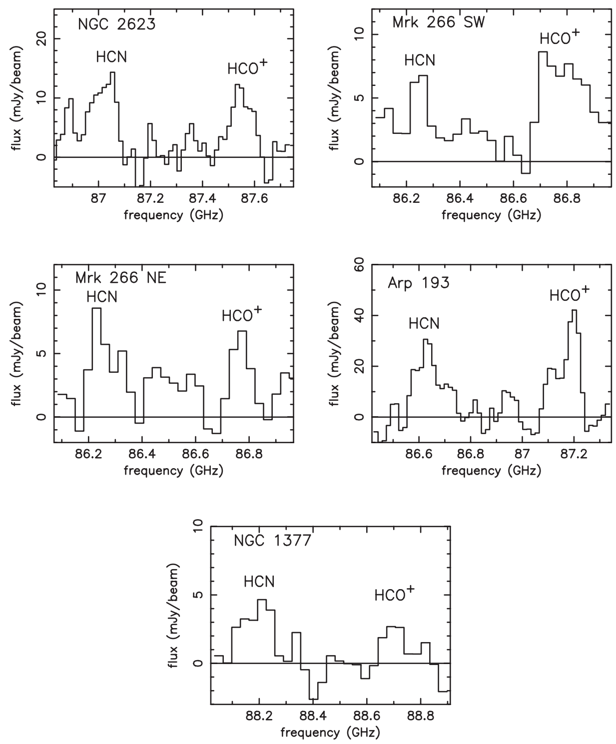

Figure 1: Example spectra of LIRGs around HCN(J=1–0) and HCO$^+$(J=1–0) lines, obtained with NMA.

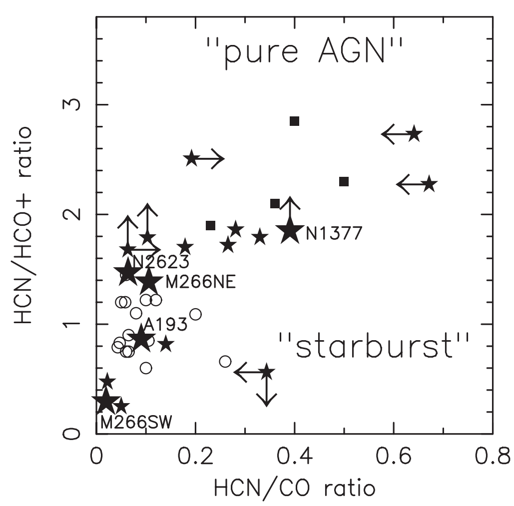

Figure 2: Filled squares: weakly-obscured AGN-dominated galaxy nuclei. Open circles: starburst galaxies. AGNs distribute at the upper part, compared to starbursts. Filled stars: LIRGs. Large filled stars with objects name: LIRGs observed this time. LIRGs with luminous buried AGN signatures at other wavelengths tend to distribute at the upper part occupied by AGN-dominated galaxy nuclei.

Reference

[1] Imanishi, M., et al.: 2009, *AJ*, **137**, 3581.

Same-Beam VLBI Observations in SELENE (Kaguya)

LIU, Q., KIKUCHI, Fuyuhiko, GOOSSENS, S., MATSUMOTO, Koji, HANADA, Hideo, PING, J, SHI, X.
TAMURA, Yoshiaki, HARADA, Yuji, ASARI, Kazuyoshi, TSURUTA, Seiichi, ISHIKAWA, Toshiaki
KAWANO, Nobuyuki, ISHIHARA, Yoshiaki, NODA, Hirotomo, SASAKI, Sho, IWATA, Takahiro, NAMIKI, Noriyuki
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SELENE (Kaguya) was successfully launched on Sep.14, 2007. It consists of a three-axis stabilized Main satellite and two small spin stabilized satellites, called Rstar and Vstar. Rstar relays the Doppler signal between the main satellite and ground station (4-way Doppler) for the world's first direct measurement of the gravity field on the far side of the Moon. The differential VLBI between Rstar and Vstar are used to determine the gravity field of the Moon precisely, especially near the limb region and for the low degree coefficients of the spherical harmonics.

Rstar and Vstar only transmit three carriers (S1: 2212, S2: 2218, S3: 2287 MHz) in S-band and one carrier (8456 MHz) in X-band; the differential phase delay (DPD) between Rstar and Vstar was obtained from the relation between correlation phase and frequency of the four carriers. In this case, the differential correlation phase at each frequency has to be estimated without the 2π ambiguity. This imposes strict conditions such as the error of the correlation phase must be lower than 4.3 deg rms. To resolve the 2π ambiguity, we have mainly used samebeam differential VLBI, in which Rstar and Vstar are observed simultaneously with the main beam of the receiving antennas.

Figure 1 shows the correlation phase fluctuations of Rstar and Vstar and their differences at S1, S2 and S3. The separation angle was between 0.04 to 0.052 deg. The integral time is 30 seconds and long-time trends, which were mainly attributed to the error of the a priori orbit, were removed by fitting 9th order polynomials. The correlation phase fluctuations of Rstar and Vstar with amplitude of about 10 deg are mainly caused by the atmosphere and ionosphere, they are very similar because the propagation paths from Rstar and Vstar to the ground stations are nearly the same. In addition, the profiles of phase fluctuations at S1, S2 and S3 are also very similar because the difference in receiving frequencies is not large. These fluctuations were reduced to a low level by differencing the correlation phases of Rstar and Vstar as shown in Fig. 1. The differences between correlation phase fluctuations of Rstar and Vstar at S1, S2 and S3 were 0.99, 1.00, 0.83 deg RMS, respectively, which satisfied the condition for obtaining DPD.

Figure 2(a) shows S-band DPD for three baselines, Ishigaki-Mizusawa, Mizusawa-Iriki and Iriki-Ishigaki. The separation angle is between 0.04 to 0.09 deg. The fluctuations of DPD for the three baselines after removing long-time trends by fitting 9th order polynomials are shown in Fig. 2(b). They were very small, about 0.0003 m (1 ps) RMS. In addition, the DPD for each baseline was estimated separately before and after 11 UT, the fluctuations have no jump at 11 UT as shown in Fig. 2(b). The closure DPD among the three baselines, i.e., the sum of DPD of (IS-MZ)+ (MZ-IR)+ (IR-IS) shown in Fig. 2(a) was also calculated. As shown in Fig. 2(c), it was very small, less than 0.001 m (3 ps). Considering one ambiguity at S-band corresponds to 0.136 m in DPD, it is confirmed that the DPD has been successfully estimated.

We also performed the orbit determination of Rstar and Vstar using the GEODYN II software. The orbit errors were evaluated by overlap analysis, where orbit differences were computed between two overlapping arcs. Orbit consistency was greatly improved by including the VLBI data. Without VLBI data, orbit consistency for Rstar is 18.01 m, and that for Vstar is 75.26 m. With VLBI data, the consistency was 2.79 m for Rstar and 10.48 m for Vstar. In addition, the precise VLBI data have been used to improve the lunar gravity field model.

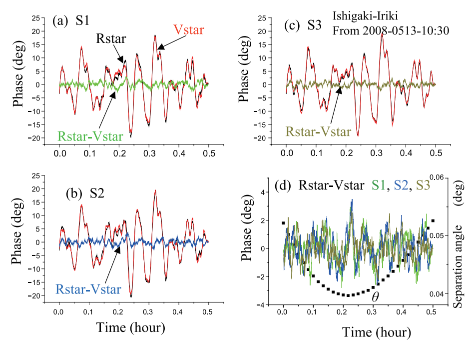

Figure 1: Correlation phase fluctuations of Rstar and Vstar at S1, S2, S3 and difference between Rstar and Vstar.

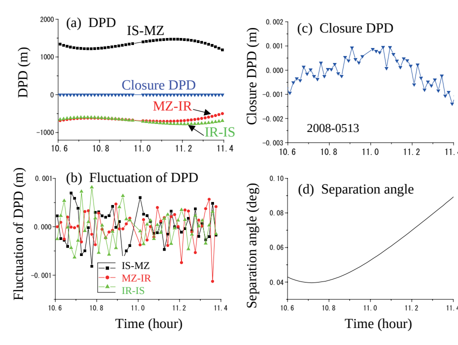

Figure 2: (a) Differential phase delay, (b) their fluctuations, (c) closure phase delay, and (d) separation angle.

Reference

[1] Liu, Q., et al.: 2009, *J. Geod. Soc. of Japan*, **55**, 243.

Formation Scenario for Wide and Close Binary Systems

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INUTSUKA, Shu-ichiro
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Observations indicate that stars are born as binary or multiple systems. The star formation occurs in the collapsing cloud core. When fragmentation occurs in the collapsing cloud, fragments evolve into binary or multiple stellar systems. However, we cannot directly observe fragmentation process, because it is embedded in a dense cloud core. Thus, we need to investigate the star and binary formation using numerical simulation. In the collapsing cloud, two adiabatic cores hierarchically appear. The gas density increases as the cloud collapses. When the central number density exceeds $n = 10^{11}\,\mathrm{cm}^{-3}$, the first adiabatic core (hereafter the first core) is formed. Then, further collapse begins inside the first core, and the second core (i.e., the protostar) is formed when the gas density reaches $n = 10^{21}\,\mathrm{cm}^{-3}$. The evolution of such collapsing cloud was investigated in some past studies. When the molecular cloud has a certain amount of the angular momentum and unmagnetized, fragmentation is possible to occur just after the first core formation [1]. However, only a few studies focused on the evolution of magnetized clouds. In this study, using resistive MHD nested grid simulations, we investigated the evolution of the magnetized disk, and found the condition for fragmentation and binary formation [2]. Figure 1 shows the cloud evolution for a typical model with different scales. In this model, fragmentation occurs twice. The first fragmentation occurs just after the first core formation. After the first core formation, the gas collapsing timescale shortens and the perturbation to induce fragmentation grows. The second fragmentation occurs just before the protostar formation. This is because (i) further collapse is initiated without the formation of spiral arms owing to the removal of the magnetic field, and (ii) the transportation of the angular momentum by the magnetic braking becomes ineffective. Figure 2 shows results of parameter survey, in which the magnetic field and angular velocity of the cloud core is parameterized. In the figure, fragmentation occurs at the epoch of the first core formation in models with blue background, while at the epoch of the second core formation in models with red background. On the other hand, models with gray background evolve to a single star without fragmentation. The figure indicates that the rotation promotes fragmentation, while the magnetic field suppresses it. In addition, fragmentation is possible even in the high-density gas region. The binary separation depends on both the magnetic field and rotation of the cloud. Models showing fragmentation at lower density (i.e., the epoch of first core formation) evolve to a wide binary system, while the model showing fragmentation at the higher density (i.e., the epoch of the second core formation) evolve to a close binary system.

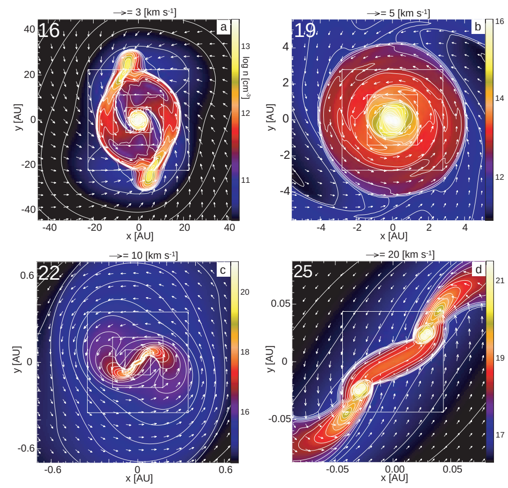

Figure 1: Density distributions (color and contours) with difference scales. Arrows indicate the velocity vector.

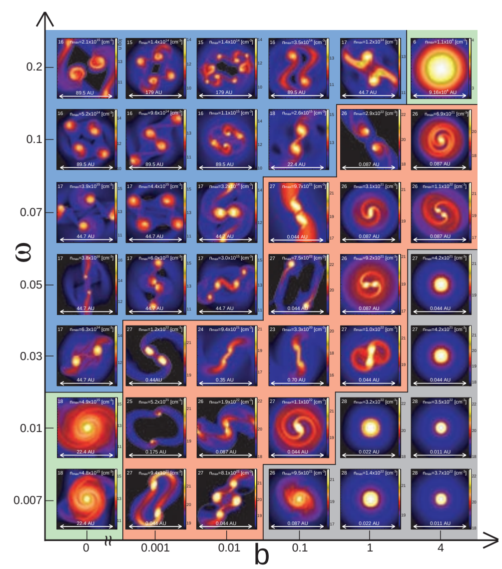

Figure 2: Results of parameter survey. The density distribution at fragmentation epoch for each model is plotted against the strength of the magnetic field (x−axis) and degree of the rotation (y−axis).

Reference

[1] Matsumoto T., Hanawa T., 2003b, *ApJ*, **595**, 913.
[2] Machida, M. N., et al.: 2008, *ApJ*, **677**, 327.

Magnetic Field Configuration at the Galactic Center Investigated by Wide Field Near-Infrared Polarimetry

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The magnetic field (MF) configuration at the Galactic center (GC) has been investigated with a wide variety of methods [1]. The discovery of polarized radio emission extending perpendicular to the Galactic plane, such as non-thermal radio filaments and polarized plumes, has provided early evidence for a substantial poloidal component of the MF at the GC. However, recent far-infrared (FIR) and sub-millimeter (sub-mm) polarimetric observations point out that the MF is generally parallel to the Galactic plane.

Previous near-infrared (NIR) polarization measurements of the GC were discussed in terms of selective absorption by the intervening interstellar dust grains in the Galactic disk. To our knowledge, no one has studied the MF configuration at the GC with NIR polarimetry. In this work, we conducted NIR polarimetric observations toward the GC, and demonstrate that NIR polarization of point sources can provide information on the MF structure at GC [2].

We carried out NIR polarimetric observations with the NIR polarimeter SIRPOL on the IRSF telescope. Comparing the Stokes parameters between high extinction stars and relatively low extinction ones, we obtained a polarization originating from magnetically aligned dust grains at the GC (Fig. 1). The distribution of the position angles shows a peak at ~20°, nearly parallel to the Galactic plane, suggesting a toroidal MF configuration. The derived direction of the MF is in good agreement with that obtained from FIR/sub-mm observations, which detect polarized thermal emission from dust in the molecular clouds at the GC [3, 4, 5]. Our results show that by subtracting foreground components, NIR polarimetry allows investigation of the MF structure at the GC.

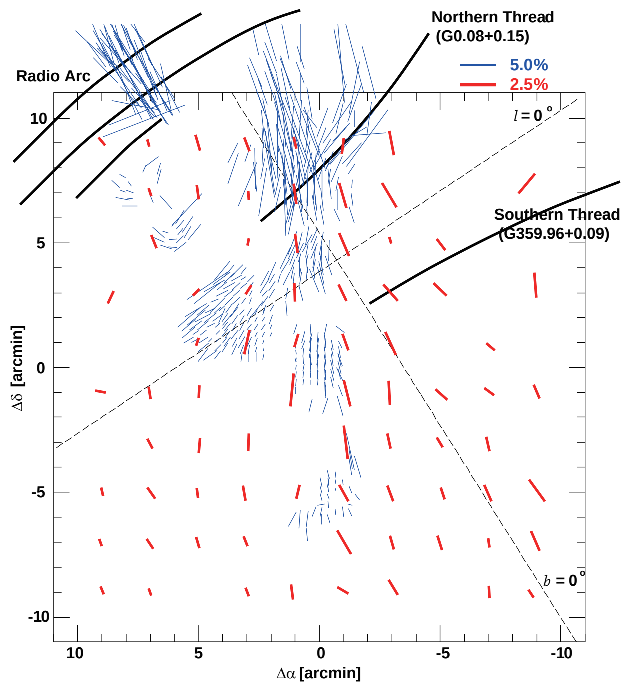

Figure 1: K_S band polarization map for the GC from our observation (*red bars*). The polarization map at the GC derived from FIR/sub-mm observations (*blue bars*) is also shown [3, 4, 5]. The length of the bars is proportional to the measured degree of polarization, and their orientation is drawn parallel to the inferred magnetic field direction. Some prominent radio filaments are shown as heavy dark lines.

References

[1] Morris, M.: 2006, *J. Phys. Conf. Ser.*, **54**, 1.
[2] Nishiyama, S., et al.: 2009, *ApJ*, **690**, 1648.
[3] Dotson, J. D., et al.: 2000, *ApJS*, **128**, 335.
[4] Novak, G., et al.: 2000, *ApJ*, **529**, 241.
[5] Chuss, D. T., et al.: 2000, *ApJ*, **599**, 1116.

Interstellar Extinction Law toward the Galactic Center: *V*, *J*, *H*, and K_S Bands

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The wavelength dependence of interstellar extinction provides important diagnostic information about the dust grain properties. Interstellar extinction law shows a large range of variability from one line of sight to another, especially in the ultraviolet and optical wavelengths. In comparing the wavelength dependence among different lines of sight, the normalization of the extinction curves by the total extinction A_V, instead of the usual color excess E_{B-V} , is vitally important. Toward the Galactic center (GC), assuming only that the center of stellar distribution in the lines of sight is at the same distance from us and that the foreground extinction is patchy, we can directly derive the ratio of the total to selective extinction (e.g., A_V / E_{V-J}), from which we can obtain the extinction ratio normalized by the total extinction (e.g., A_J/A_V). By plotting the apparent magnitude versus the color excess of a group of stars, one obtains a straight line with the slope equal to the ratio of total to selective extinction ratio.

In this work, we have determined the ratios of total to selective extinction directly from observations in the optical V band and near-infrared J band toward the GC [1]. The OGLE Galactic bulge fields were observed with the SIRIUS camera on the IRSF telescope. We constructed color-magnitude diagrams, and measured the regression of the mean color of red clump stars in the GC on their mean magnitude. We obtain $A_V / E_{V-J} = 1.251 \pm 0.014$ (see Fig. 1) and $A_V / E_{V-J} = 0.225 \pm 0.007$. From these ratios, we have derived $A_J/A_V = 0.188 \pm 0.005$; if we combine A_J/A_V with the near-infrared extinction ratios obtained by Nishiyama et al. [2] for more reddened fields near the GC, we get $A_V : A_J : A_H : A_{K_S} = 1 : 0.188 : 0.108 : 0.062$, which implies steeply declining extinction toward the longer wavelengths.

The resultant A_λ / A_V in the JHK_S wavelength range is a steeply declining function. The frequently used extinction curve derived by Cardelli et al. (1989 [3]) (for $R_V = 3.1$, $A_V / E_{V-J} = 1.393$, see Fig. 1), which is based on Rieke & Lebofsky (1985 [4]), decreases much more slowly toward the longer wavelengths. In particular, it is striking that the K_S band extinction is ≈ 1/16 of the visual extinction A_V , much smaller than one tenth of A_V so far employed ([3, 4]).

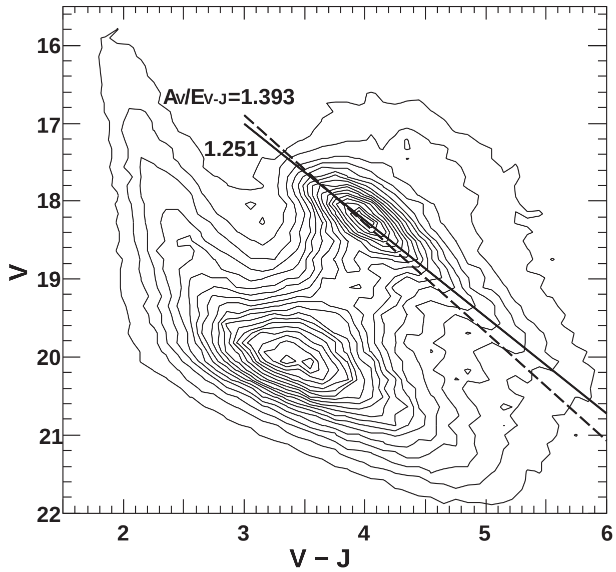

Figure 1: *V* versus *V–J* color magnitude diagram of the OGLE bulge fields. The *solid* and *dashed* lines show the direction of the interstellar extinction with $A_V / E_{V-J} = 1.251$ (this work [1]), and 1.393 ($R_V = 3.1$ [3], respectively. It is clear that the *solid* line is along the ridge of bulge red clump stars.

References

[1] Nishiyama, S., et al.: 2008, *ApJ*, **680**, 1174.
[2] Nishiyama, S., et al.: 2006, *ApJ*, **638**, 839.
[3] Cardelli, J. A., et al.: 1989, *ApJ*, **345**, 245.
[4] Rieke, G. H., Lebofsky, M. J.: 1985, *ApJ*, **288**, 618.

Evolution of the Anemone Active Region NOAA 10798 and the Related Geo-Effective Flares and CMEs

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Space weather has attracted a lot of attention in recent times. Space weather research involves various related fields. Therefore, in order to understand what kind of events on the solar surface can generate a large geomagnetic storm, it is necessary to study active phenomena on the solar surface and the propagation in the interplanetary space, in relation to the surrounding magnetic structure. We investigated the evolution of the Active Region (AR) NOAA 10798 and the features on/near the sun and in the interplanetary space, since it generated flares/coronal mass ejections (CMEs) that caused a large geomagnetic storm on 2005 August 24 with the minimum Dst index of −216 nT [1].

The AR emerged in the middle of a small coronal hole (CH), and formed a sea anemone like configuration [2] (Fig. 1). Hα filaments were formed in the AR, which have southward axial field. Two halo CMEs associated with M-class flares occurred on 2005 August 22. The speeds of the CMEs were extremely fast, and recorded about 1200 and 2400 km s^{-1}, respectively. The second CME was especially fast, and probably caught up and interacted with the first (slower) CME during their travelings toward the earth (Fig. 1). The interplanetary disturbances with strong southward magnetic field of about −50 nT and strong compression of plasma were produced.

The reasons why the CMEs were particularly geo-effective were the high speeds of the two CMEs and their interaction as well as the CMEs traveled directly toward the earth. The high speeds of the CMEs are more notable. We suggest that the fast CMEs are probably a consequence of the eruption inside a CH from an anemone AR. Eruptive activities of anemone ARs are usually low [3]. However, the relation between anemone ARs and fast solar winds have been paid attentions to, and recent papers (e.g. [4]) have also reported the association between fast Halo CMEs and CHs. Our results indicate that flares/CMEs from anemone ARs are also important for space weather researches.

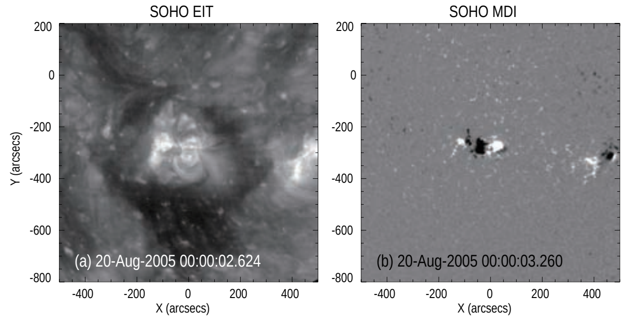

Figure 1: Coronal feature of the AR NOAA 10798. (a): An EUV (195 Å) image obtained with *SOHO*/EIT. The bright region near the center of the image is the AR. The surrounding dark region is a CH. (b): A magnetogram taken with *SOHO*/MDI.

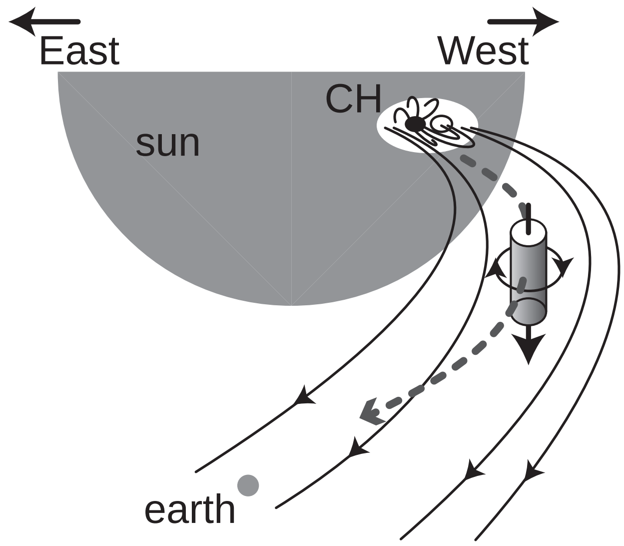

Figure 2: Schematic cartoon of AR NOAA 10798 and related flares/CMEs. The ejected plasma is bent eastward by the surrounding magnetic field with positive magnetic polarity. The ejecta from the anemone AR becomes a magnetic cloud (shown as a cylinder) that has a southward axial magnetic field and is approaching to the earth.

References

[1] Asai, A., et al.: 2009, *JGR*, **114**, A00A21.
[2] Shibata, K., et al.: 1994, *ApJ*, **431**, L51.
[3] Asai, A., et al.: 2008, *ApJ*, **673**, 1188.
[4] Liu, Y., Hayashi, K.: 2006, *ApJ*, **640**, 1135.

Strongly Blueshifted Phenomena Observed with *Hinode*/EIS in the 2006 December 13 Solar Flare

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Solar flares are very spectacular, and are accompanied by a variety of plasma motions. These plasma motions can be observed as phenomena accompanied by line shifts (Doppler shifts) in spectroscopic observations. We examined in detail strongly blueshifted emission lines observed with the EUV Imaging Spectrometer (EIS) on board the Hinode satellite that were observed to be associated with the 2006 December 13 solar flare [1]. We found two kinds of blueshifted phenomenon associated with the X3.4 flare.

One was related to a plasmoid ejection seen in soft X-rays (SXRs), and we call it BS1. It was very bright in all the lines used for the observations (Fig. 1). The Doppler velocity is about 250 km s^{-1}. Although they are associated with the plasmoid ejection, there are no corresponding flare ribbons. Therefore, we concluded that this blueshift is the ejected plasma, and is not an evaporation flow.

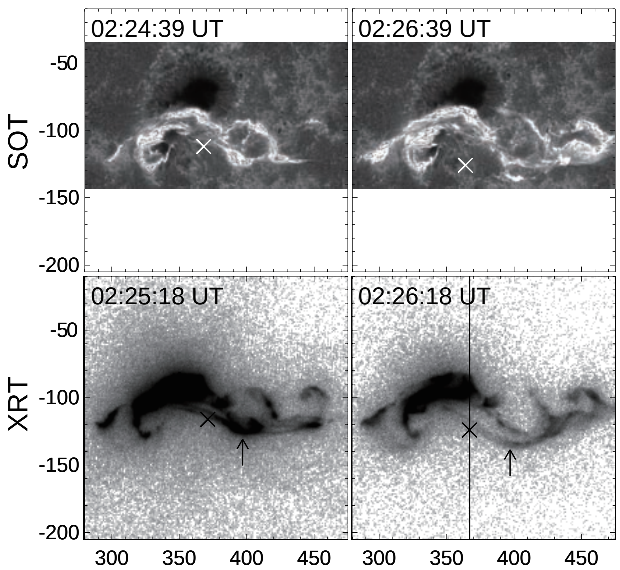

Figure 1: *Top*: Ca II (H-line) images taken with *Hinode*/SOT. *Bottom*: Soft X-ray images obtained with the *Hinode*/XRT (negative images). The cross signs (×) point to the positions of the BS1. The arrows in the bottom right panel follows the plasmoid ejection seen in XRT. The vertical line in the bottom right panel shows the position of the EIS slit.

The other, on the other hand, was very faint, and showed spectra that broaden in the wavelength space (BS2; Fig. 2). The center of the blueshifted component recorded a Doppler velocity of about 100 km s^{-1}, the drift velocity is about 450 km s^{-1}. These components are observed only in the hottest lines of the raster observation, and therefore, the plasma must be heated to more than 2 MK. The blueshift region corresponds to the propagation of the coronal wavelike (arc-shaped) ejection seen in the SXR images. The SXR ejection is thought to be an MHD fast-mode shock wave with the Alfvén Mach number of about 1.4. This is, therefore, the first spectroscopic observation of an MHD fast-mode shock wave associated with a flare.

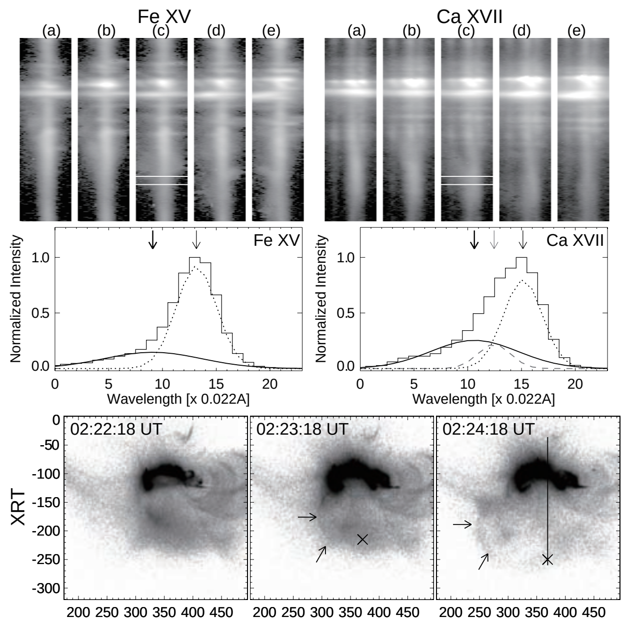

Figure 1: *Top*: Time sequenced spectra of Fe XV (*left*) and Ca XVII(*right*) windows observed with *Hinode*/EIS. *Middle*: Normalized spectra at BS2 in the windows. The solid histograms show the spectra, and the dotted and solid black lines are the fitting results that represent the main and the blueshift components of the line. The peaks of each line are shown with thin and thick arrows. Bottom: SXR negative images taken with the *Hinode*/XRT. The arrows show the front of the wavelike ejection. Crosses (×) represent BS2 determined by the Fe XV line. The vertical line in the bottom right panel shows the position of the EIS slit.

Reference

[1] Asai, A., et al.: 2008, *ApJ*, **685**, 622.

Exploring the substellar temperature regime down to ~550 K

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Observations in the 1980–90s have established that the conventional spectral sequence from O to M stars is followed by even cooler dwarf stars — L and T dwarfs (effective temperature T_{eff} = 2100–1300 K and T_{eff} $\lesssim$1300 K, respectively). Some L dwarfs and all T dwarfs correspond to "brown dwarf" whose mass is below 0.075 solar masses.

Previous large area surveys (e.g., 2MASS, SDSS) have discovered about 600 L dwarfs and 100 T dwarfs so far. On the other hand, a deeper large area survey is necessary to detect cooler (i.e., intrinsically fainter) brown dwarfs. Ongoing UKIDSS Large Area Survey (LAS) meets the requirement. The UKIDSS/LAS will cover 4000 sq. degrees using the UKIRT Wide Field Camera (WFCAM), with 4 mag deeper detection limit than 2MASS. From the resultant data, the coolest T dwarfs and, further more, a new class of dwarfs cooler than T are expected to be found. Such ultra cool dwarfs are referred to be "Y" dwarfs, and their spectra are expected to be analogous to the spectrum of the Jupiter.

The Cool Dwarf Science Working group, an international collaboration including UK and Japanese astronomers, has developed the selection method using UKIDSS *Y JHK* colors and the combination of SDSS *z-J*, *i-z* to select L/T and Y dwarf candidates. Followup spectroscopy using large telescopes such as Subaru and Gemini is adopted to determine their spectral types finally. As a result, we have discovered 72 T dwarfs from the UKIDSS early data so far, indicating that our method is highly effective (e.g., [1, 2]). Six of them are classified as T8.5–T9, coolest types among known T dwarfs. In particular, ULAS J133553.45+113005.2 (ULAS335) has been shown to be the coolest T dwarf ever known (Figures 1, 2), with the effective temperature of 550 K and the mass of about 20 Jupiter masses [3]. After the completion of UUKIDSS/LAS, we expect to discover Y dwarfs together with hundreds of T dwarfs, which will shed light on the formation processes of substellar objects, the Initial Mass Function (IMF) and the formation history.

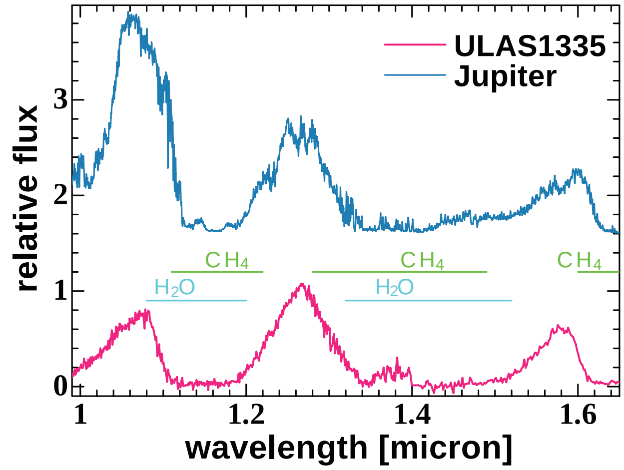

Figure 1: Near-infrared spectrum of the coolest brown dwarf ever discovered (ULAS1335) (lower). For comparison spectrum of the Jupiter is shown (above ULAS1335). Broad absorption bands of H_2O and CH_4 are seen in their spectra.

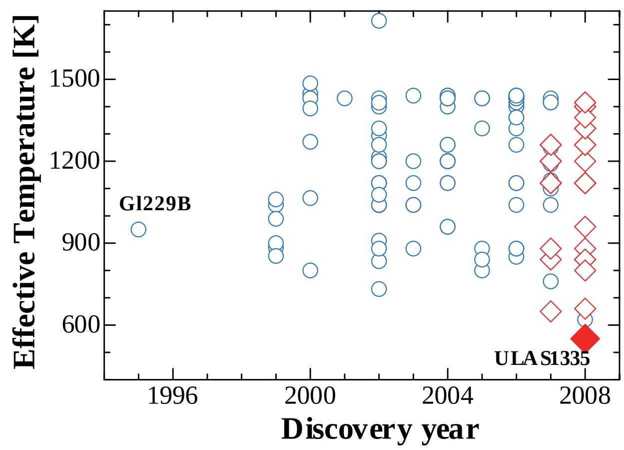

Figure 2: History of the coolest brown dwarf discovered: T dwarfs discovered by UKIDSS (◇) and previous surveys (○) are plotted against their discovery year.

References

[1] Kendall, T. R., et al.: 2007, *A&A*, **466**, 1059.
[2] Pinfield, D. J., et al.: 2008, *MNRAS*, **390**, 304.
[3] Burningham, B., et al.: 2008, *MNRAS*, **391**, 320.

High-Precision Correction of the Instrumental Polarization for High-Level Polarimetry of the Sun

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The polarization of the light from the Sun shows the surface magnetic field of the Sun. However, generally it is not avoidable for big solar telescopes to have some folding mirrors, which vary the polarization of the incident light. In such cases, the instrumental polarization has to be corrected with a high precision to evaluate the incident polarization of the light from the Sun.

On the other hand, to carry out high precision polarization measurements, it is also required to calibrate the polarimeter itself with a high precision as well. Generally unpolarized light (usually the continuum from the Sun) is necessary for the calibration, but the instrumental polarization changes the unpolarized incident light into polarized light. Therefore, the calibration with unpolarized light is difficult in the system with the instrumental polarization. This fact means that the evaluation of the parameters of the instrumental polarization and that of the calibration parameters for the polarimeter are coupled together.

We installed a polarimeter of NAOJ with ferroelectric liquid crystals into the Domeless Solar Telescope of Hida Observatory, Kyoto University, and developed a method to evaluate the parameters of the instrumental polarization and those of the polarimeters simultaneously [1]. As shown in Figure 1, the Domeless Solar Telescope has two folding mirrors, which produce the instrumental polarization. However, the spectrograph rotation and the function of the turning-over of the telescope attitude cancel the instrumental polarization virtually. We evaluated the polarization parameters with a high precision using these characteristics, and we succeeded to reproduce the measured instrumental polarization by the calculated ones with RMS errors of 0.03 %, which meets the required error level to measure the weak polarization in chromospheric lines. Figure 2 shows a sample set of the polarization spectra with the slit positioned on a sunspot. The raw data show significant crosstalk, but the spectra corrected for the instrumental polarization show almost symmetric polarization profiles.

The method developed in this work is applicable for various solar telescopes with oblique reflections. Furthermore, it will become a guide to consider the method to correct the instrumental polarization for the solar telescope designed in future, where the oblique reflections cannot be avoided.

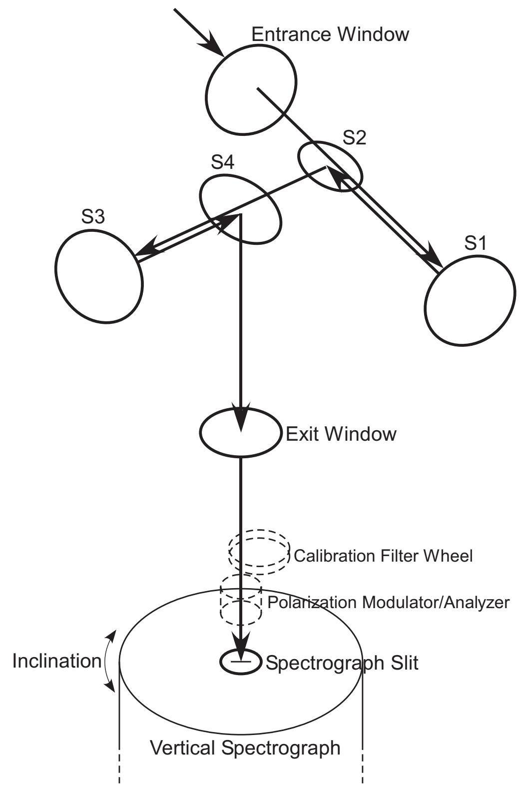

Figure 1: Layout of the light path in the Domeless Solar Telescope. Mirrors S2 and S4 are folding mirrors. The signs of Stokes Q and U signals into the polarimeter can be reversed with a rotation of the spectrograph, and that of Stokes V can be done so with the turning-over of the the telescope.

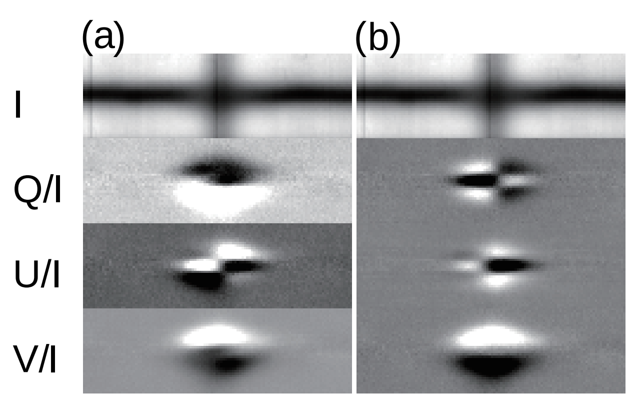

Figure 2: A sample set of Stokes Spectra of the Fe 6302.5 line taken at a sunspot. The horizontal and vertical directions are along the slit and the dispersion, respectively. Panels (a) and (b) show the spectra before and after the correction of the instrumental polarization.

Reference

[1] Hanaoka, Y.: 2009, *PASJ*, **62**, 357-365.

Sensitivity improvement of gravitational wave detector TAMA300

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The TAMA project of NAOJ has been developing a laser interferometer gravitational wave detector TAMA300. Here, we report a sensitivity improvement of TAMA300.

We have been working on the new vibration isolation system, called "Seismic Attenuation System (SAS)", since 2005. The sensitivity of TAMA300 at around 100 Hz was previously limited by alignment control noise. In order to improve the sensitivity in the low frequency band, we replaced the previous vibration isolation system to the SAS for all of four test masses. As a result of the installation and tuning works, we could decrease the control bandwidth of the alignment servo system. It leads an update of the sensitivity.

The vibration isolation performance of the SAS essentially relies on low resonant frequencies of the mechanical systems. The SAS has a multiple-stage structure with a total height of about 2.5 meters so as to realize seismic filtration from the low frequency such as 50 mHz. In order to suppress excited motions of the low frequency resonances, the active local controls are applied. All of the local control servos are realized by digital control systems based on LabVIEW. With the intrinsic vibration isolation performance of the SAS and the local control systems, test mass motions are well stabilized in all frequency band. It was confirmed by the optical path length measurement of the 300-m arm cavity that the RMS motion of the cavity length is improved from 0.84 μm to 1.4 μm [1].

After the shaking down and tuning of the SAS, the power recycled operation of the 300-m Fabry–Perot Michelson interferometer has been recovered. The current sensitivity of TAMA300 is shown in Figure ??. The revised wave front sensing technique for the alignment control helps to keep the stability of the sensitivity in the kHz band, while the improved sensitivity at the frequency band below 100 Hz is not compromised. As a result, the sensitivity between 0.1 Hz to 400 Hz was improved. The floor sensitivity is $h = 1.3\times10^{-21}\ \mathrm{m}/\sqrt{\mathrm{Hz}}$ at around 1 kHz. The contribution of the alignment control noise is also shown in the figure. It indicates that this noise is not limiting the current sensitivity. This was owing to the reduction of the alignment control bandwidth down to 3 Hz.

Figure 2 shows how distant compact binaries TAMA300 should be able to detect. Each curve means the event at the indicated distance is detected with S/N of 10, assuming the direction of the event and the polarization are optimal for the detector. For all binary masses farther events should be detected than before. Particularly, the distance for stellar mass binaries are remarkably improved as the low frequency sensitivity contributes to it.

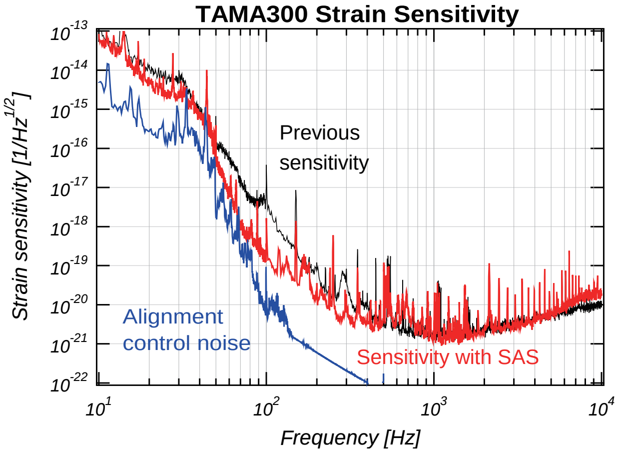

Figure 1: Current sensitivity of TAMA300 (red), being compered with the previous sensitivity (black). The blue line indicates the estimation of the alignment control noise.

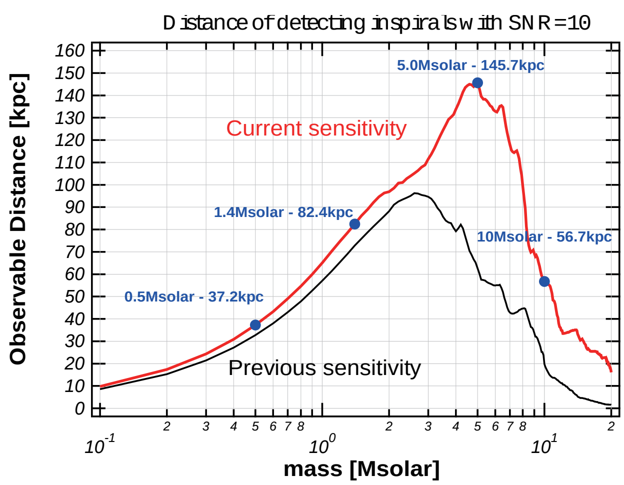

Figure 2: "Observable distance" indicates how distant comact binaries TAMA300 should be able to detect. This shows the event at this distance is detected with S/N of 10, assuming the direction of the event and the polarization are optimal for the detector.

Reference

[1] Arai, K., et al.: 2008, *J. Phys.: Conf. Ser.*, **120**, 032010.

Theoretical and Observational Studies Using *Hinode* of the Magnetic-Field Emergence into the Solar Atmosphere

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We have performed a three-dimensional MHD simulation for the emergence of a partially split flux tube into the solar atmosphere, which is focused on the mechanism of the activity observed on the Sun such as the merging of magnetic polarity regions in the photosphere and the formation of multiple flux domains in the corona. The simulation reproduces that a small polarity region associated with a rotational flow merges into a main polarity region, and later in this main polarity region is developed a rotational flow in the same direction as the small polarity region. In accordance with the photospheric merging process, multiple flux domains form in the corona and a current layer separating these flux domains travels outward as the flux domains expand. We also investigated the nature of helicity injection in a multi-pole system.

We reported a result of investigating the structure of subsurface magnetic field in an emerging flux region on the Sun, using the data obtained by *Hinode*. We derived several statistical quantities characterizing the distribution of surface magnetic field. These quantities were then used to investigate the structure of invisible subsurface magnetic field, such as the twist of field lines, by comparing the observations with numerical simulations. The result suggests a possible way of investigating the structure of subsurface magnetic field by using observational information on surface magnetic field.

We used *Hinode*'s observational data of photospheric magnetic field to study the evolution of a flare-producing active region. *Hinode* can provide the temporal development of the photospheric field as a vector quantity, which shows that magnetic shear initially developed in an active region (AR10930), then it decreased toward the onset of an X-class flare. The magnetic helicity in this active region first increased rapidly, while it became saturated in the late phase. We explained the physical origin of these features in terms of the emergence of a twisted flux tube into the solar atmosphere. We showed how helicity evolution relates to the occurrence of a flare, suggesting that the helicity evolution obtained from measurements of the photospheric field can be used for flare prediction [1, 2, 3].

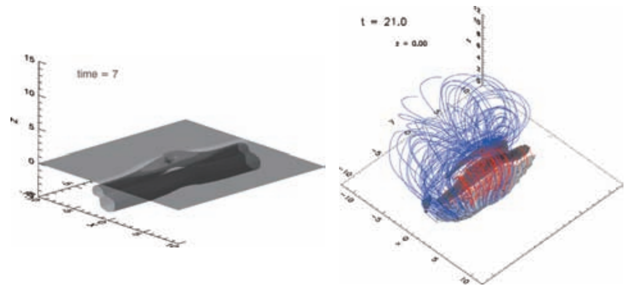

Figure 1: Emergence of a partially split flux tube. The horizontal plane indicates the photosphere.

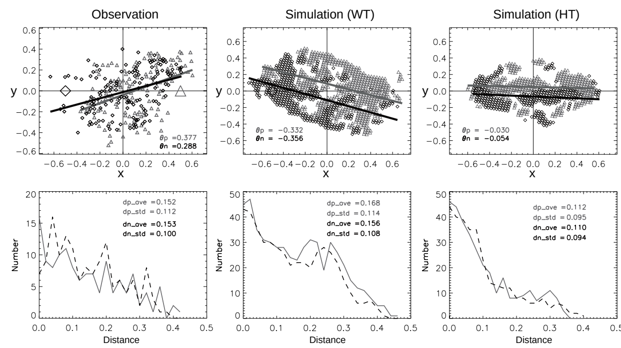

Figure 2: Scattered diagrams of positive (triangles) and negative (diamonds) polarity regions. Left: Data from Hinode. Middle: Simulation of a weakly twisted flux tube. Right: Simulation of a highly twisted flux tube. Note that the observational result has mirror symmetry with the simulations.

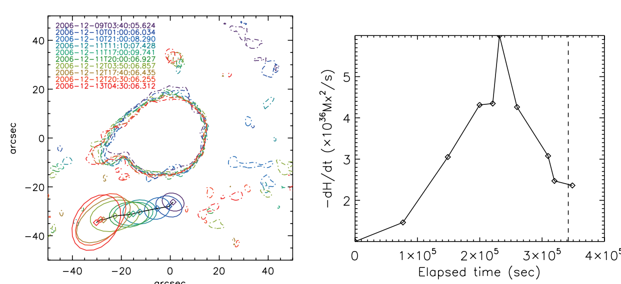

Figure 1: Left: Relative sunspot motions obtained from an elliptic approximation applied to the boundary of the travelling sunspot. Right: Time variation of the injection rate of magnetic helicity. The vertical dashed line indicates the occurrence time of a flare.

References

[1] Magara, T.: 2008, *PASJ*, **60**, 809.
[2] Magara, T.: 2008, *ApJL*, **685**, L91.
[3] Magara, T., Tsuneta, S.: 2008, *PASJ*, **60**, 1181.

Young Brown Dwarfs in the Core of the W3 Main Star-Forming Region

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We present the results of deep and high-resolution (FWHM ~0.35") *JHK* near-infrared (NIR) observations with the Subaru telescope, to search for very low mass young stellar objects in the W3 Main star-forming region. The NIR survey covers an area of ~2.6 arcmin^2 with 10σ limiting magnitude exceeding 20 mag in the *JHK* bands. The survey is sensitive enough to provide unprecedented details in W3 IRS 5 and IRS 3a regions and reveals a census of the stellar population down to objects below the hydrogen-burning limit.

We construct *JHK* color-color and $J–H/J$ and $H–K/K$ color-magnitude diagrams to identify very low luminosity young stellar objects and to estimate their masses (see for example Figure 1). Based on these color-color and color-magnitude diagrams, we identified a rich population of embedded YSO candidates with infrared excesses (Class I and Class II), associated with the W3 Main region. A large number of red sources ($H–K > 2$) have also been detected around W3 Main, which are arranged from the northwest toward the southeast regions. Most of these are concentrated around W3 IRS 5. We argue that these red stars are most probably pre-main-sequence (PMS) stars with intrinsic color excesses.

We find that the slope of the *K*-band luminosity function of W3 Main is lower than the typical values reported for young embedded clusters. Based on the comparison between theoretical evolutionary models of very low-mass PMS objects with the observed color-magnitude diagram, we find there exists a substantial substellar population in the observed region.

The mass function does not show the presence of cutoff and sharp turnover around the substellar limit, at least at the hydrogen-burning limit. Furthermore, the mass function slope indicates that the number ratio of young brown dwarfs and hydrogen-burning stars in the W3 Main is probably higher than those in Trapezium and IC 348.

The presence of mass segregation, in the sense that relatively massive YSOs lie near the cluster center, is seen. The estimated dynamical evolution time indicates that the observed mass segregation in the W3 Main may be the imprint of the star formation process [4].

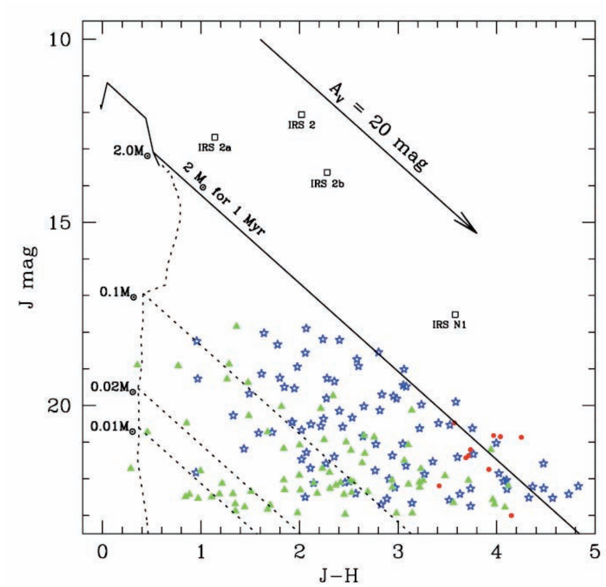

Figure 1: Color-magnitude diagram for the YSO candidates in W3 Main. Class II candidates are indicated by blue stars, filled green triangles represent Class I candidates, and the filled red circles show red sources with $H–K > 2$ with *J* band counterparts. Known IRS sources are shown with boxes. The solid and dotted curves denote the loci of 1 Myr old PMS stars; derived from the models of [1], [2] and [3].

References

[1] Palla, F., Stahler, S.: 1999, *ApJ*, **525**, 772.
[2] Baraffe, I., et al.: 1998, *A&A*, **337**, 403.
[3] Baraffe, I., et al.: 2003, *A&A*, **402**, 701.
[4] Ojha, D., et al.: 2009, *ApJ*, **693**, 634.

Exoplanet Detection with Polarimetry

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Since the discovery of planets orbiting around normal stars other than the Sun, exoplanet detection is one of the hottest topics in astronomy. Most (>80%) of the exoplanet candidates have been detected via the radial velocity method. The transit method is detecting many candidates (especially with the Kepler and the Corot missions). However, the other successful methods are still limited. Therefore, an independent approach is important to reveal various physical parameters of exoplanets.

Aged planets shine by reflected light at optical and near-IR wavelengths. Thus, exoplanet detection with reflected light is a promissing technique [1, 2].

In paerticular, high precision polarimetry is considered to be direct detection if the waekly polarized light is extracted from the highly diluted (unpolarized) light from the central star. Close-in planets are expected show as much as a few 10^{-6} polarization. In order to achieve this, a high precision ($<10^{-6}$) polarimeter is necessary. The Planetpol is an optical polarimeter composed of PEM (photoelastic modulator) and APD (avalanche photodiode) that can attain a polarization accuracy of $<10^{-6}$ [3].

The PlanetPol observations were made during a Saharan dust event over the La Palma observatory that show excess linear polarization in the horizontal direction due to the passage of the starlight through the dust [4]. The polarization reached a maximum value of 4.8×10^{-5}. These results imply that some fraction of the dust grain population aligns with a preferred orientation. We suggest a possible mechanism for vertical orientation resulting from the electric field in the atmosphere.

The PlanetPol observations were also made for 55 Cnc and τ Boo in an attempt to detect the partially polarized reflected light from the planets orbiting these two stars [5]. The polarization of this system is very stable, showing no sign of the periodic variations that would be expected if a short-period planet were detected. The measured standard deviation of the nightly averaged Stokes Q/I and U/I parameters is 2.2×10^{-6} (Figure 1). These results contrast markedly with the recent claim of detection of a periodic polarization signal from HD189733 with amplitude 2×10^{-4}, attributed to the planet HD189733b [6]. Our multiple scattering model atmosphere calculations indicate that the large amplitude periodic polarization signal from the HD189733 system cannot be explained in terms of reflected light from the planet HD189733b. If the observations are confirmed it would be important to consider the possible contribution of star spots to the polarization of the system, given that HD189733 is an active star with much larger photometric variations than τ Boo or 55 Cnc.

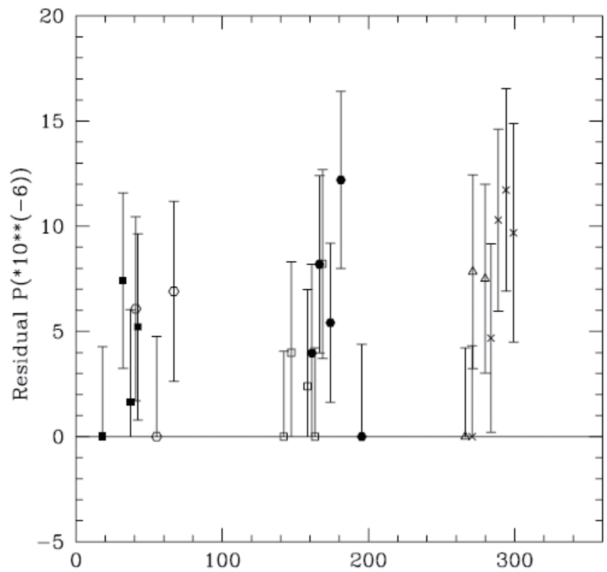

Figure 1: Polarization vs. orbital angle of 55 Cnc e (period= 2.817d). 180 degrees correspond to the minimum illumination. Polarization due to telescope and instument is subtracted. Different symbols correspond different nights.

References

[1] Collier Cameron, A., et al.: 1999, *Nature*, **402**, 751.
[2] Leigh, C., et al.: 2003, *MNRAS*, **344**, 1271.
[3] Hough, J. H., et al.: 2006, *PASP*, **118**, 1302.
[4] Bailey, J., et al.: 2008, *MNRAS*, **386**, 1016.
[5] Lucas, P. W., et al.: 2009, *MNRAS*, **393**, 229.
[6] Berdyugina, S. V., et al.: 2008, *ApJ*, **673**, L83.

Achievement of the CLIO target sensitivity at room temperature

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CLIO (Cryogenic Laser Interferometer Observatory) is the first cryogenic interferometric gravitational wave detector in the world. It has 100-m baseline length and is located in an underground mine at Kamioka. It is a prototype interferometer for the future LCGT project as well as TAMA300 detector in Mitaka campus. To demonstrate advantages of the cryogenic interferometer and the Kamioka mine as a quiet site is the purpose.

The project started to excavate the center room and two tunnels in 2002. The vacuum and the cryogenic systems were prepared by 2005. After the installation of the interferometer optics and the suspension systems, the operation of CLIO started in 2006. Test of the cryogenic systems and the interferometer operation with cryogenic mirrors were demonstrated in 2006.

After the demonstration of cryogenic operations, our activities have been focused on the noise investigation at room temperature. At the time of 2007, the strain sensitivity below 20 Hz is comparable to that of the LIGO detector, which is a couple of 4-km detectors in United State. Because the baseline length is fourty times shorter than that of LIGO, it means that CLIO achived fourty times smaller noise level [1]. This is due to a big advantage of underground site. In February 2007, a 57-hours observation data was obtained to search for gravitational wave signal at 22.38 Hz from the pulsar J0835-4510 (Vela pulsar) [2].

To demonstrate the reduction of the noise level by mirror cooling, the detector noise should be limited by thermal noises at room temperature. In the summer of 2008, the sensitivity of CLIO at room temperature was improved in a wide frequency range above 20 Hz. This improvement was obtained by elimination of thermal noise from dissipation caused by eddy current induced to the coil support made of aluminum, as well as tuning of beam spot positions on the mirror surfaces, which indicates possible noise coupling from any kind of mirror rotation noise. Current best floor sensitivity is 2.5×10^{-19} m/$\sqrt{\mathrm{Hz}}$ at 250 Hz as shown in Figure 1. We estimated the fundamental noises of the CLIO as follows. Seismic noise was estimated by the ground motion and transfer function of the vibration isolation systems. The suspension thermal noise was estimated from the quality factor of the violin mode resonances. The mirror thermal noise at room temperature was supposed to be dominated by thermoelastic damping. Shot noise was estimated from incident optical power to the photodetector and its response. From these estimations, we concluded that the noise level is enough close to the fundamental limit at room temperature and the cooling of the mirrors is necessary for further noise investigations.

The next step is to realize noise reduction by mirror cooling. Now we are preparing noise hunting with the cryogenic mirrors including works to refine the cryogenic suspensions and the interferometer systems.

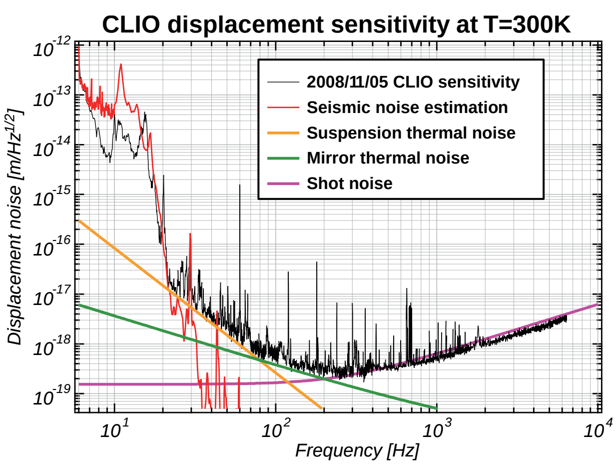

Figure 1: Current displacement sensitivity of CLIO (black). Noise estimations of seismic noise (red), suspension thermal noise (yellow), mirror thermal noise (green), and shot noise (purple) are also shown.

References

[1] Yamamoto, K., et al.: 2008, *J. Phys. Conf. Ser.*, **122**, 12002.
[2] Akutsu, T., et al.: 2008, *Class. Quantum Grav.*, **25**, 225011.

Detection of water ice grains on the surface of the circumstellar disk around HD 142527

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Water ice grains theoretically play a number of important roles in protoplanetary and debris disks. Ice enhances the solid material in the cold outer part of a protoplanetary disk, which promotes the formation of cores of gaseous planets [1]. [2] show that ice absorption can also be found in the light scattered by icy grains and that multi-wavelength imaging in NIR wavebands, including in the H_2O band at 3.1 μm, is a useful tool to constrain the ice distribution in the disk.

We have applied this method to the circumstellar disk around a Herbig Ae star, HD142527, which is an ideal target for imaging in the H_2O band for a number of reasons. Coronagraphic imaging observations for the HD142527 using a L' band (3.77 μm) and a narrow-band H_2O ice filter (3.08 μm) were performed using the Coronagraphic Imager with Adaptive Optics (CIAO) on the Subaru Telescope. Figure 1 shows the PSF-subtracted images of the circumstellar disk around HD 142527 in the H_2O ice filter with the 0.6″ mask and in the L' band without a mask, respectively. The eastern and western arcs discovered by [3] in the H and K bands were also detected in the H_2O and L' band. The spectrum for the total flux densities is also presented for comparison in the left panel of Figure 2, which shows few or no features in the H_2O band. The contribution from the scattered light to the total flux density in the H and K bands is estimated to be 3.1–3.2% [3], indicating that most of the flux density in the total spectrum is attributed to the emission from the star itself and thermal emission from hot grains in the vicinity of the star where icy grains cannot survive. Therefore, the absence of a 3 μm ice feature is a natural consequence. In contrast, the spectra of the scattered light show a clear reduction in the H_2O ice band (3.08 μm), suggesting the presence of a 3 μm absorption feature. This result can be explained by the water ice grains in the disk surface where the light scattering occurs. Comparing the model predictions [2] with the observed color diffrence, the size of the scattering grains is ~1 μm or more.

Our results successfully demonstrate that multi-waveband (K/H_2O/L' imaging is useful to detect water ice grains in a (face-on) disk. The application of this method for other face-on disks will enhance our knowledge on the presence and spatial distribution of water ice in circumstellar disks [4].

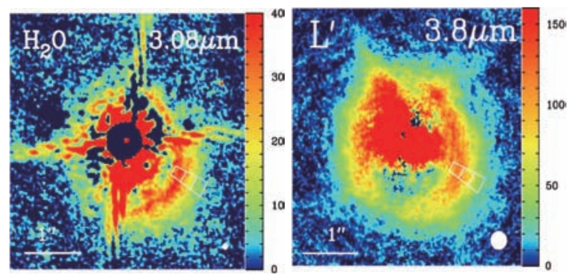

Figure 1: PSF-subtracted 3.08 μm (left) and L' band (right) image of the disk around HD142527. The unit of intensity is mJy arcsec^{-2}. North is up; east is to the left. The three enclosed regions (regions A, B, and C from inner to outer regions) on the southwest structure are the positions from which the spectra shown in Figure 2 are extracted.

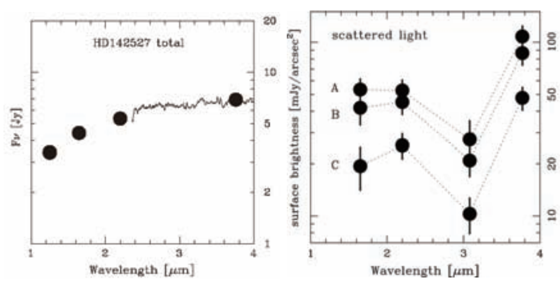

Figure 2: Left panel shows NIR photometry and a spectrum of the entire HD 142527 system, which is used as the representative of the illuminating source spectrum. Right panel represents the spectra of the scattered light from regions A, B, and C shown in Figure 1. The dip in 3 μm, probably due to H_2O ice grains, is present in all the scattered light spectra, while it is not seen in the total spectrum, which is dominated by thermal emission from hot dust near the central star.

References

[1] Hayashi, C., et al.: 1985, in *Protostars and Planets II*, ed. D.C. Black & M. S. Matthews (Tucson, AZ: Univ. Arizona Press), 1100.
[2] Inoue, A., et al.: 2008, *PASJ*, **60**, 557.
[3] Fukagawa, M., et al.: 2006, *ApJ*, **636**, L153.
[4] Honda, M., et al.: 2009, *ApJ*, **690**, L110.

Small-JASMINE (Small Satellite with 30cm-class telescope)

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JASMINE is the acronym of the Japan Astrometry Satellite Mission for INfrared Exploration. The main objective of JASMINE is to study the fundamental structure and evolution of the Milky Way bulge components. In order to accomplish these objectives, JASMINE will measure trigonometric parallaxes, positions and proper motions of stars in the Galactic bulge with a precision of 10 microarcsec. Before the launch of JASMINE, we plan a launch of Small-JASMINE mission which is a downsized version of JASMINE.

The primary mirror for the telescope of Small-JASMINE has a diameter of 30cm with a focal length of about 5m. The wavelength to be observed is around 2μm with the HgCdTe detectors. A target accuracy of the mission is the same with JASMINE, 10μas. The size of the field of view is about 0.87deg × 0.87deg by using 2 × 2 detectors on the focal plane. The telescope is designed to have only one field of view, which is different from the designs of other astrometric satellites (but the same with JASMINE). JASMINE will observe overlapping fields without gaps to survey a total area of about a few square degrees around the Galactic bulge. Accordingly we make a "large frame" of a square degrees by linking the small frames using stars in overlapping regions. Small-JASMINE will observe the region of Galactic bulge repeatedly during the mission life.

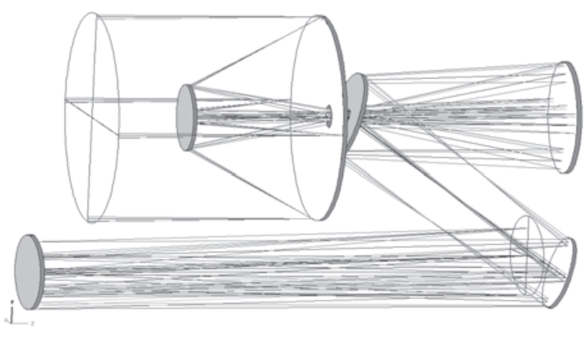

Figure 1: Overview of JASMINE Optics.

Optical Design	3 mirrors (Improved Korsch)
Wave length	$1.5\,\mu m \le \lambda \le 2.5\,\mu m$
Aperture	30 cm
Focal length	4.86 m
Field size	0.87º × 0.87º
Size of Focal Plane	6 cm × 6 cm
Detector	HgCdTe
Number of pixels	2K × 2K
Number of detectors	4 (2 × 2)
Pixel size	15 μm
Pixel on sky	138 mas

Table 1: Summary of JASMINE Optics.

Number of Small Frames	4 × 4
Observing Magnitude	K=11 mag
Integration time	3sec
Time for making a Large Frame	0.25 h
Mission Life	1.5 year

Table 2: Parameters.

Pointing Stability	280 mas/3 sec
Thermal Stability	0.4 K/0.25 h
Orbit	600 Km Earth Orbit
Ponting Accuracy	0.1 deg
Data Transfer Rate	2 Mbps

Table 3: Requirements.

Reference

[1] Yano, T., et al.: 2008, *Proceedings of the IAU*, IAU Symp. **248**, 296-297.

Development of Very Small Astrometry Satellite: Nano-JASMINE

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JASMINE Project Office of National Astronomical Observatory of Japan, Kyoto University, University of Tokyo and Tokyo University of Marine Science and Technology develop a very small astrometry satellite: Nano- JASMINE. Nano-JASMINE is mounted a 5 cm effective diameter telescope and aims to measure positions and motions of stars with the accuracy of a few milliarcseconds in $z-band$ (λ ~ 0.9 μm). The satellite weighs about 25 kg and is developed aiming at the launch in 2010 [1]. JASMINE Project Office contributes to develop a small reflecting telescope and a driver circuit for a CCD detector. In 2008, we developed and evaluated these instruments and conducted the integration test and environmental test. This paper reports the results of development.

First, the small reflecting telescope was made of aluminum alloy because of the suppression of effects of strain induced by thermal changes. The reflecting surfaces were polished with a single-crystal diamond cutting tools and deposited with Cr and Au vapor. Developed telescope weighs 1.7 kg and occupies a volume of only 17×12×12 cm [2]. Wavefront errors of developed telescope were measured by an interferometer. As a result, the RSS wavefront error is λ/14 (λ = 800 nm). Then it is confirmed that developed telescope can achieve a diffractionlimitted performance.

Second, new driver circuit for a CCD detector was developed. Developed circuit can be operated in TDI (Time Delay Integration) mode. In TDI mode, the rate of charge transfer is synchronized with the scan velocity of the spinning satellite. Developed circuit was evaluated through the measurement of system gain, dark current and CTE. Fig. 1 shows the relationship between accumulated charges and linearity error of CCD.

Next, Structure and Thermal Model (STM) of satellite was developed for the thermal test and the vibration test. Using STM, mechanical interfaces of satellite were confirmed and thermal vacuum test was conducted. Fig. 2 shows the overview of STM before the thermal vacuum test. Moreover, electric integration test was conducted and the electric interface, each function and power consumption were confirmed. These results were reflected to engineering model.

Over the next year, engineering model is to be developed and examined, and flight model is to be developed. About the launch, NAOJ, University of Tokyo, Alcantara Cyclone Space and SDO Yuzhnoye agreed the memorandum of understanding (MOU) to launch Nano-JASMINE by Cyclone-4 rocket in the Federal Republic of Brazil.

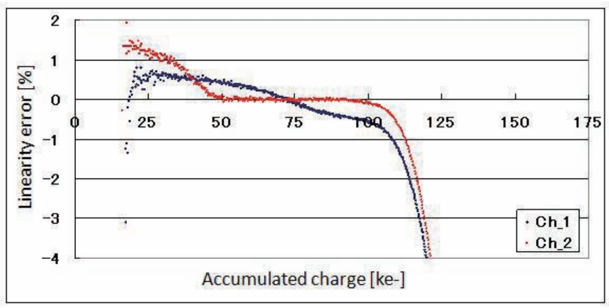

Figure 1: The relationship between accumulated charges and linearity error of CCD. The linearity error is increased at 115ke- where accumulated charge is saturated.

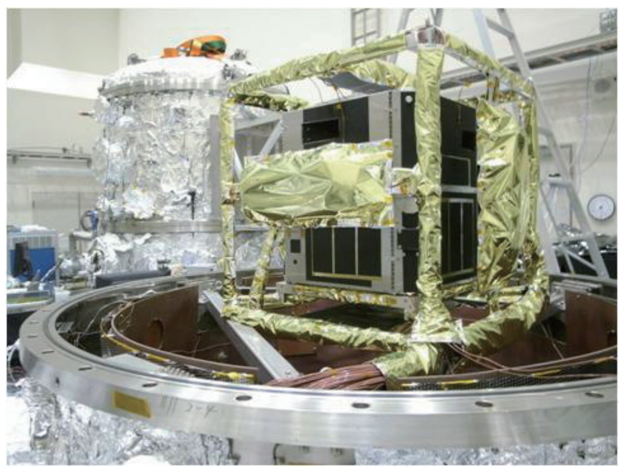

Figure 2: Nano-JASMINE STM at the NAOJ space chamber just before the thermal vacuum test. Test heaters which control outer temperature are equipped around STM.

References

[1] Kobayashi, Y., et al.: 2006, *SPIE*, **6265**, 6265544.
[2] Suganuma, M.,et al.: 2006, *SPIE*, **6265**, 6265545.

Neutrino-Nucleus Reaction Cross Sections for Light Element Synthesis in Supernova Explosions

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Neutrino nucleosynthesis (the ν-process) in supernovae is one of main synthesis processes for rare light elements such as Li and B. In order to evaluate the light element yields, cross sections of neutrino-nucleus reactions should be precisely calculated. Recently, a new shell model Hamiltonian (the SFO Hamiltonian) reproduces well many characteristics of *p*-shell nuclei [1]. We evaluate cross sections of ν-^{12}C and ν-^{4}He reactions using the SFO and WBP Hamiltonians, respectively. Then, we discuss light element synthesis through the ν-process in supernovae using the new cross sections [2].

Cross sections of ν-^{12}C reactions are calculated using the SFO Hamiltonian [1]. Both of neutral- and chargedcurrent reactions are taken into account. Branching ratios for multiple particle emissions are evaluated using Hauser-Fechbach calculations. Cross sections of ν-^{4}He reactions are also calculated using the WBP Hamiltonian. Figure 1 shows the cross sections of neutral-current ν-^{12}C reactions as a function of neutrino temperature. Neutrino energy distribution is assumed to obey Fermi distributions with zero chemical potential. Only large branches are shown in this figure. Tables of the cross sections for ν-^{12}C and ν-^{4}He are listed in [2].

We evaluate the yields of light elements in a 16.2 $M_\odot$ supernova with the new cross sections. The yields of ^{7}Li and ^{11}B are 2.67 × 10.7 $M_\odot$ and 7.14 × 10.7 $M_\odot$, respectively. These yields are larger than the corresponding ones with conventional cross sections by a factor of 1.1. The yields of ^{6}Li, ^{9}Be, and a radioactive nucleus ^{10}Be are a level of 10^{-11} $M_\odot$ and increase compared to the ones with the conventional rates. The temperature range of $\nu_{\mu,\tau}$ and $\bar{\nu}_{\mu,\tau}$ in supernovae appropriate for the Galactic chemical evolution of ^{11}B is reevaluated to be 4.3–6.5 MeV. This range is slightly shifted to lower energy compared to the case with the conventional rates. The increase in the ^{7}Li and ^{11}B yields due to neutrino oscillations is also shown in [2]. This result is important in the determination of unknown neutrino oscillation parameters.

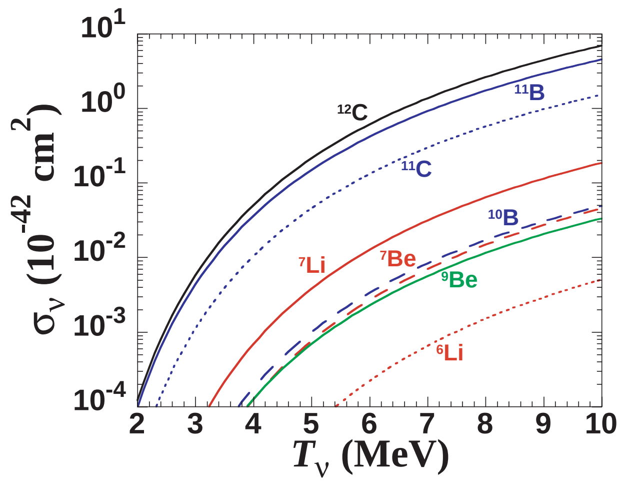

Figure 1: Calculation neutrino-^{12}C reaction cross sections as a function of neutrino temperature T_ν for the SFO Hamiltonian.

References

[1] Suzuki, T., et al.: 2003, *PRC*, **67**, 0444302.
[2] Yoshida, T., et al.: 2008, *ApJ*, **686**, 448.

Central Spiral Structure of Molecular Gas in Maffei 2

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We made CO(1–0), CO(2–1), CS(2–1) lines and 103 GHz continuum observations of the nearby barred spiral galaxy Maffei 2 with Nobeyama Millimeter Array (NMA) [1]. The CO integrated intensity maps show two peaks in the central region (Figure 1). By investigating the velocity structure, however, we found the spiral structure of molecular gas in the central region (Figures 2, 3). The offset ridges of molecular gas along the leading side of the bar continue to the spiral structure embedded in the weak oval structure which is regarded as an x2 orbit. The size of these structure is less than $R \sim 100$ pc. The mass within $R \sim 35$ pc is estimated to be $2 \times 10^8 M_\odot$ from the rotation velocity of molecular gas. The high mass concentration is consistent with theoretical predictions concerning the creation of such a nuclear spiral structure [2]. A comparison with tracers of dense gas and star-forming region suggests that the dense molecular gas traced by the CS(2–1) line is formed at the crossing points of the x1 and x2 orbits and that the star-forming region appears downstream of the peak of the dense gas.

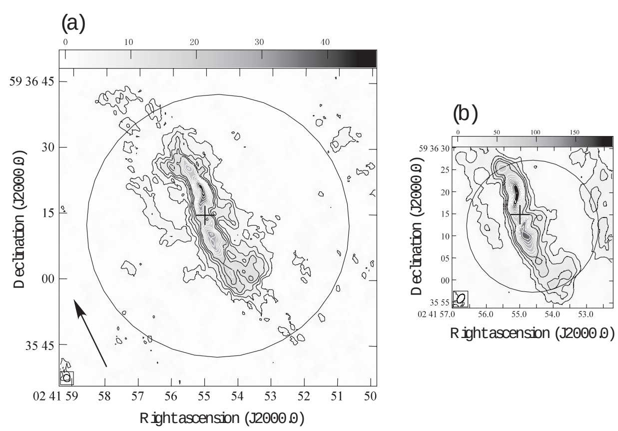

Figure 1: (a) CO(1–0) and (b) CO(2–1) integrated intensity maps. The cross indicates the galactic center. The circles indicate the field of view of NMA. The arrow indicates the position angle of the major axis of Maffei 2.

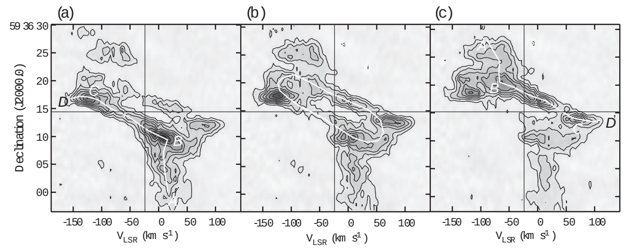

Figure 2: P-V diagrams of CO(2–1) along major axis of Maffei 2 and parallel to the major axis. (a) 0.9″ eastern side of the major axis. (b) along the major axis. (c) 0.9″ western side of the major axis. Two parallel components that correspond to the spiral structure are seen.

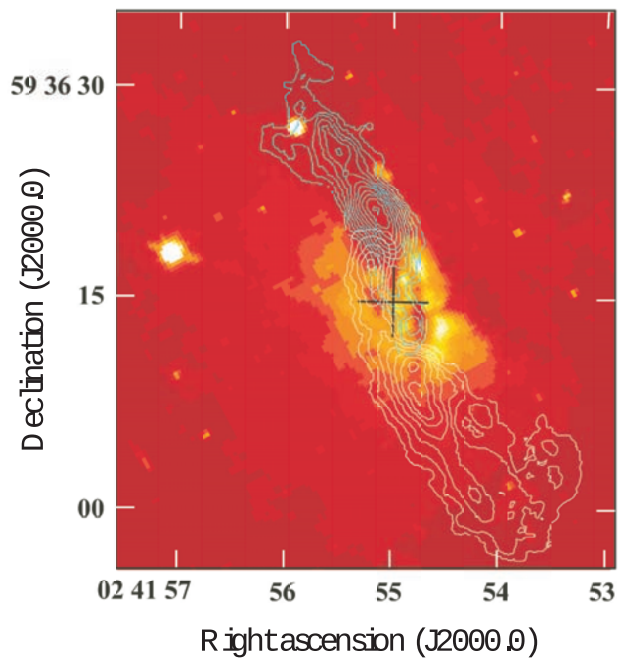

Figure 3: Contour) Integrated intensity map of CO(1–0) of the two components seen in Fig. 2. Color) The HST image (F814W).

References

[1] Kuno, N., et al.: 2008, *PASJ*, **60**, 475.
[2] Ann, H. B., Thakur, P.: 2005, *ApJ*, **620**, 197.

Near-Infrared Imaging Polarimetry of M42: Aperture Polarimetry of Point-like Sources

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We have conducted aperture polarimetry of ~500 stars of the Orion Nebula Cluster (ONC) in M42 based on our wide-field (~8′ × ~8′) *JHKs* band polarimetry (Figure 1) [1]. Most of the near-infrared (NIR) polarizations are dichroic, with position angles of polarization agreeing, both globally and locally, with previous far-infrared (FIR) and submillimeter observations [2], having taken into account the 90º difference in angles between dichroic absorption and emission. This is consistent with the idea that both NIR dichroic polarizations and FIR/submillimeter thermal polarizations trace the magnetic fields in the OMC-1 region. The magnetic fields inferred from these observations show a pinch at scales less than 0.5 pc with a centroid near IRc2. The hourglass-shaped magnetic field pattern is explained by the models in which the magnetic field lines are dragged along with the contracting gas and then wound up by rotation in a disk. The highly polarized region to the northwest of IRc2 and the low-polarized region near the bright bar are also common among NIR and FIR/submillimeter data, although a few regions of discrepancy exist.

We have also discerned 51 possible highly polarized sources whose polarizations are more likely to be intrinsic rather than dichroic. Their polarization efficiencies ($P(H)/A(H)$) are too large to be explained by the interstellar polarization. These include nine young brown dwarfs that suggest a higher polarization efficiency (see Figure 2), which may present geometrical evidence for (unresolved) circumstellar structures around young brown dwarfs.

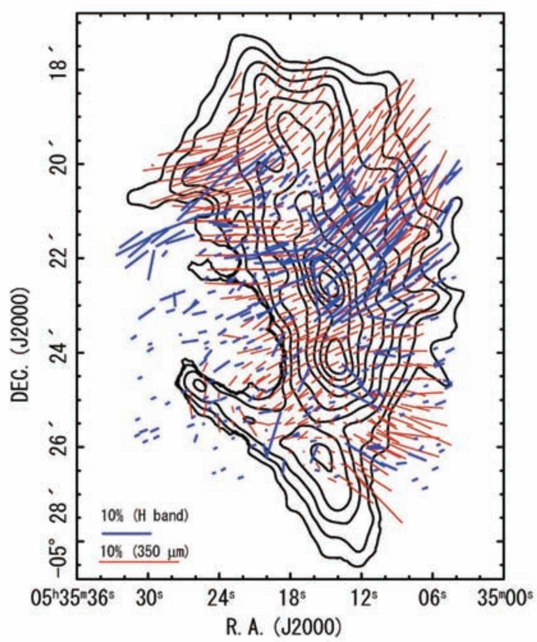

Figure 1: *H* band (shown in blue) polarization vectors and 350 μm (shown in red, rotated by 90°) polarization vectors overlaid on the 350 μm contours. 10% polarization vectors for both wavelengths are shown at the bottom-left.

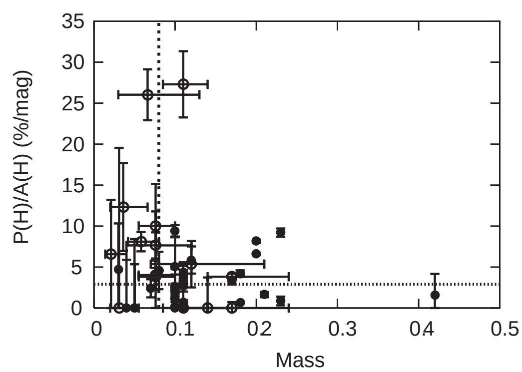

Figure 2: $P(H)/A(H)$ for the 28 sources cross-identified with Slesnik et al. (2004) [3] (filled circle) and Riddick et al. (2007) [4] (open circle). The horizontal dotted line indicates $P(H)/A(H)$ = 2.9, which corresponds to the assumed maximum value for interstellar polarization. The vertical dotted line indicates 0.08 $M_{\odot}$, which corresponds to the brown dwarf mass limit.

References

[1] Kusakabe, N., et al.: 2008, *AJ*, **136**, 621.
[2] Schleuning, D. A.: 1998, *ApJ*, **493**, 811.
[3] Slesnick, C. L., et al.: 2004, *ApJ*, **610**, 1045.
[4] Riddick, F. C., et al.: 2007, *MNRAS*, **381**, 1077.

Infrared Imaging Polarimetry of S106 in Cygnus

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SIRPOL [1] is the polarization mode of the three-band simultaneous camera SIRIUS [2] on the 1.4-m telescope, IRSF, at the South African Astronomical Observatory (SAAO). Now, SIRPOL has two polarization modes, linear polarization and circular polarization modes.

The polarization happens when dust reflects the light from the illuminating stars or absorb the light from the background stars. Thus, the imaging polarimetry can reveal the distribution of the reflection nebula and the characteristic of the dust in the region, and discover the illuminating stars. In addition, we can reveal the structure of the magnetic fields in the observing area using polarimetry of the background stars because dust grains are aligned by the magnetic fields. In particular, near infrared polarimetry makes it possible to reveal the structure of reflection nebulae and magnetic fields in star-forming regions because infrared observations can detect the objects in high dusty regions.

However, in spite of its usefulness for understanding the physical characteristics, “wide-field” infrared polarimetry has been scarcely carried out because of the lack of an appropriate polarimeter. Thus, the study with polarimetry toward even nearby star-forming regions was very limited.

Figure 1 shows JHK_s composite images of the S106 cluster forming region. Fig. 1(a) is the image in intensity and Fig. 1(b) is the same image but in only polarized intensity. We could easily find the clear difference between these two images. The distribution of the polarized intensity has the characteristic structures on the eastern and western edges of the S106 nebula and around the exciting star, IRS 4. Compared with the distribution of the molecular gas, the ridges of the polarized intensity are corresponding to the boundary of the molecular cloud, and we suggest that the polarized components originate in the light reflected by the dust grain in the dense gas. In addition, we found two small infrared reflection nebulae (SIRNe). Two SIRNe in Fig. 1(b) have the polarized component with a small size, and in particular, SIRN 1 is associated with an early B protostar.

Figure 2 shows the aperture polarization vector map of point-like sources in the *H*-band. We found the difference between the polarization angle and the axis of the S106 nebula because the overall polarization angle distribution of the area outside the cluster is ~120°. However, corresponding to the results of sub-millimeter observations, we revealed that the magnetic field was drawn into the center of the cluster. We suggested that this feature was caused by the clear difference between the rotation axis and the position angle of the magnetic field.

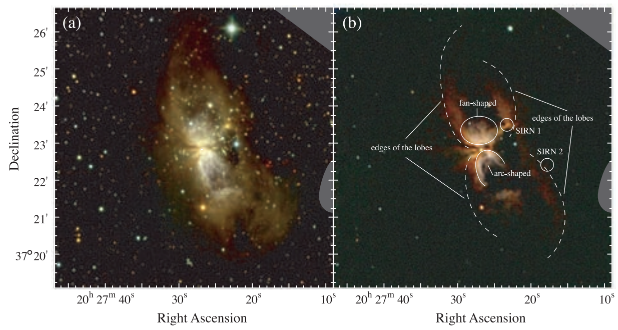

Figure 1: NIR three-color composite images of the S106 nebula in intensity (a) and in polarized intensity (b).

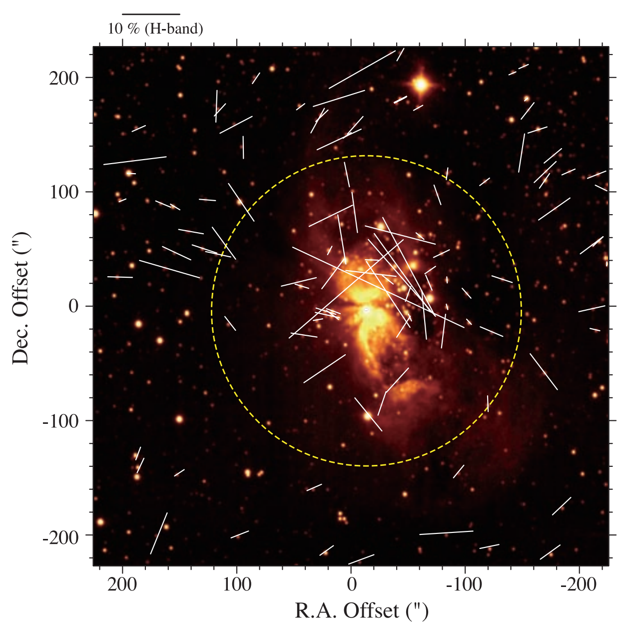

Figure 2: Polarization vector of each point-like source on the *H*-band image.

References

[1] Kandori, R., et al.: 2006, *SPIE*, **6269**, 159.
[2] Nagayama, T., et al.: 2003, *SPIE*, **484**, 459.
[3] Saito, H., et al.: 2008, *AJ*, **137**, 3149.

Discovery of the Multiple-Core Systems toward Cluster-Forming Regions

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Most stars in the galactic disk are formed as a cluster in dense gas within giant molecular clouds as members of clusters [1]. The cluster consists of stars of various masses, and massive stars exist at the centers of clusters. Thus, clusters must play a critical role in the origins of some of the most fundamental properties of the galactic stellar population. Recently, observational results suggested that clusters are formed in the clumps with a cluster size scale [2] and that a few hot cores (0.03 pc) exist in cluster-forming regions. On the other hand, many cores must be formed in one clump to create a cluster with a large number of stars. Therefore, we carried out to reveal the inner structure of the clump with cluster formation.

We identified 171 cores in six clumps with cluster formation using Nobeyama Millimeter Array. The left panel of Figure 1 shows the relationship between the line width and the radius of the cores and 18 clumps identified by [2]. Although the line width of the clumps is in a narrow range, the line width of the cores is in a much wider range. Such features are seen even in the individual regions in the right panels of Figure 1. This indicates that the degree of the dissipation of the turbulent motion varies even within a single clump.

Figure 2 shows that the mass of the cores increases in proportion to the square of the line width, although the dispersion of the plot is large. Considering that the internal kinetic motion basically decreases with time, from this tendency, dense gas with a large kinetic motion in a clump seems to be necessary to form massive cores.

The stellar number density of the cluster is mentioned as an important characteristic of a cluster. The stellar number density of the cluster is generally much higher than that of typical low-mass star-forming regions. The recent results found a good relationship between the number density of YSOs with the clump and the H_2 density of the clump [2]. Figure 3 shows the relationship between the number density of the cores in the clump and the H_2 density of the clump. A good correlation exists between the core number density and the H_2 density of the clump. This indicates that the stellar number density in the clump is controlled the core-formation mechanism.

We determined that the mechanism of cluster formation would strongly depend on the mechanism of core formation and that the mechanism of core formation would be controlled by both the H_2 density structure and the kinetic motion in a clump. Moreover, the characteristics of the cluster would be determined by the distribution of the physical parameters of cores in the clump [3].

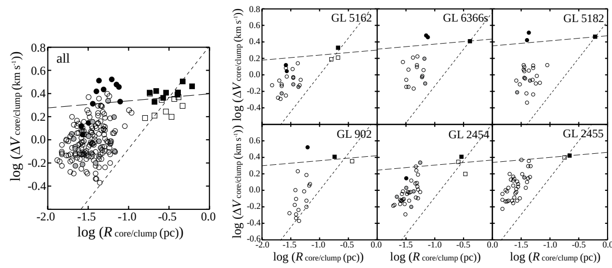

Figure 1: The correlation between the radius and the line width of cores/clumps. The circles and squares indicate cores and clumps, respectively. The white, gray, and black symbols indicate the objects without, with YSOs, and with massive stars, respectively. The long- and short-dashed lines indicate the relationships of $\Delta V \sim R^{0.06}$ and $\sim R^{0.89}$, respectively.

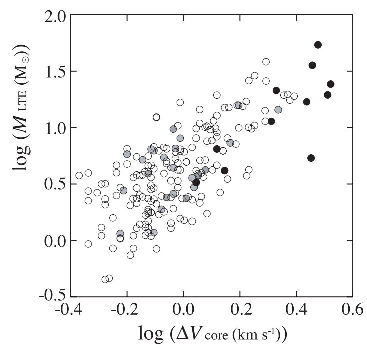

Figure 2: The LTE mass plotted against the line width of the cores. The symbols are the same as in Figure 1.

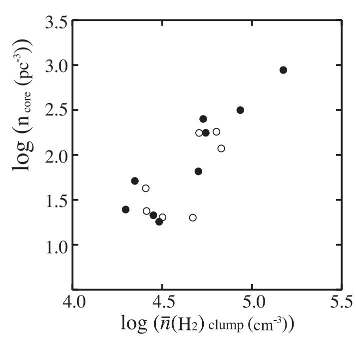

Figure 3: The number density of the cores in each clump plotted against the average H_2 density of the clump.

References

[1] Lada, C. J., Lada, E. A.: 2003, *ARA&A*, **41**, 57.
[2] Saito, H., Saito, M., et al.: 2008, *ApJ*, **659**, 459.
[3] Saito, H., Saito, M., et al.: 2009, *ApJS*, **178**, 302.

Four-Quadrant Phase Mask Coronagraph with a Jacquinot-Lyot Stop

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For direct detection of Earth-like extrasolar planets, extremely high dynamic range is required for coronagraphs. A four-quadrant phase-mask (FQPM) coronagraph is one of the most promising methods in that it has a relatively small inner working angle, large discovery space, and high optical throughput with technically simple instrumentation [1]. The FQPM is put on a focal plane to divide a stellar image into four-quadrant regions and provide π-phase difference between the adjacent quadrants (Fig. 1). This causes destructive interference inside the pupil area on a following reimaged pupil plane, where a Lyot-stop is put to block stellar light diffracted outside the pupil. Theoretically, the FQPM coronagraph can realize perfect stellar elimination for point-like stars. However, the FQPM coronagraph is very sensitive to tip-tilt errors and finite stellar angular sizes. Thus residual stellar noise would prevent us from detecting faint companions around partially resolved nearby stars.

To solve this problem, we propose to use a Jacquinot pupil as a Lyot stop of the FQPM coronagraph [2]. The Jacquinot pupil has a Gaussian-like shaped edge, as shown in Figure 1, to suppress a stellar diffraction halo in specified regions of the focal plane (so-called working region) where planetary signals can be detected. We manufactured the Jacquinot pupil by means of a chemical etching process on a nickel substrate (diameter of 1.125 mm and thickness of about 20 μm), and conducted laboratory experiments of the FQPM coronagraph. As the FQPM, we used a four-quadrant polarization mask (FQPoM) utilizing polarization interferometry [3].

Figure 2 shows coronagraphic images, acquired with a He-Ne laser (λ = 633 nm), for the circular- and Jacquinot-Lyot stops for tip-tilt errors from 0.1 to 0.3 λ/D. Dotted lines and an arrow in the image (top left) show boundaries of the FQPoM and a tip-tilt direction, respectively. As can be seen in the results, the residual halo for the circular-Lyot stop increases rapidly with the tip-tilt error, while that for the Jacquinot-Lyot stop can be well suppressed (1.4×10^{-6} at 7.5 λ/D) in the working regions (dashed circles) even for the large tip-tilt error of 0.3 λ/D. Consequently, the laboratory experiments demonstrate that the Jacquinot-Lyot stop would enhance the FQPM-coronagraphic performance effectively.

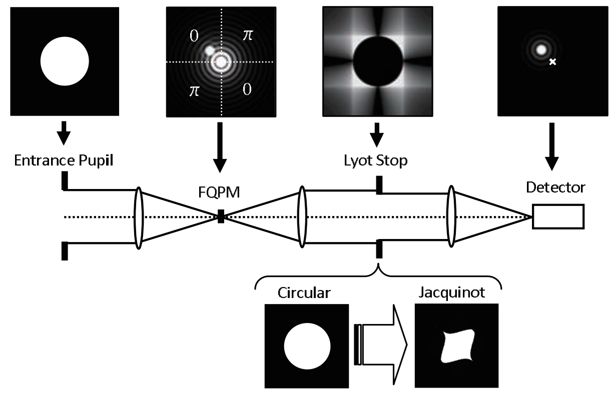

Figure 1: A schematic optical setup of a FQPM coronagraph equipped with a Jacquinot-Lyot stop.

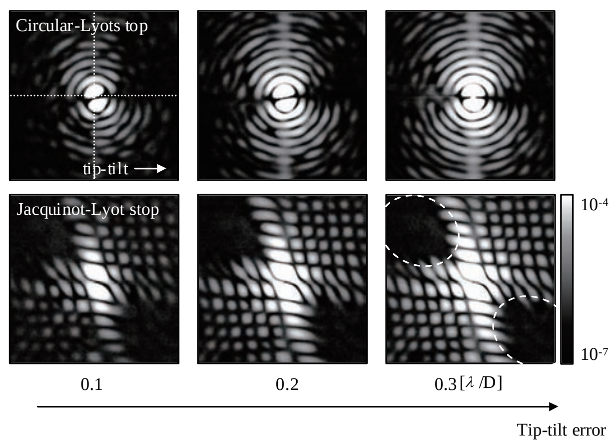

Figure 2: Results of laboratory experiments of a FQPM coronagraph with circular- and Jacquinot-Lyot stops for various tip-tilt errors.

References

[1] Rouan, D., et al.: 2000, *PASP*, **112**, 1479.
[2] Murakami, N., et al.: 2008, *ApJ*, **677**, 1425.
[3] Baba, N., et al.: 2002, *Opt. Lett.*, **27**, 1373.

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An Eight-Octant Phase-Mask Coronagraph

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For direct detection and characterization of extrasolar planets, light from their parent stars must be strongly suppressed by coronagraphs. We propose an eight-octant phase-mask (EOPM) coronagraph [1], which is analogous to a previously proposed four-quadrant phase-mask (FQPM) one [2] (Fig. 1). It is expected that the EOPM coronagraph has fourth-order sensitivity to tiptilt errors while the sensitivity of the FQPM one is second-order. This higher order behavior of the EOPM coronagraph will be advantageous for observations of partially resolved nearby stars.

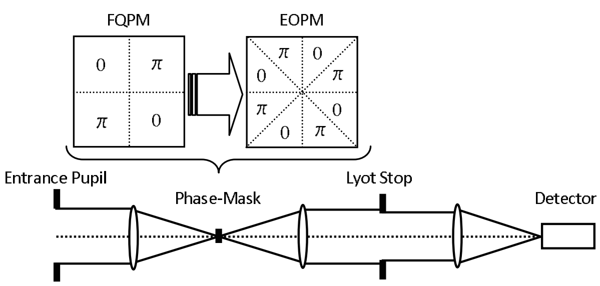

Figure 1: Principles of FQPM and EOPM coronagraphs.

We manufactured an eight-segmented phase-mask utilizing a nematic liquid-crystal (LC) device (Fig. 2). A phase retardation of each segment can be adjusted by an applied voltage to the device via flexible printed circuits (FPC). The LC phase-mask can be switched between FQPM- and EOPM-mode by applying voltages to appropriate segments (e.g., segments L1, L3, R2, and R4 for the EOPM-mode).

We carried out laboratory experiments of the phasemask coronagraphs by using a He-Ne laser (λ = 633 nm). In Figure 2, acquired Lyot-stop images for the both coronagraphic modes are also shown together with those of numerical simulations. Figure 3 shows residual intensity of acquired coronagraphic images as a function of a tip-tilt error. The coronagraphic images for 0.4 λ/D tip-tilt error are also shown. Note that we subtract a zero-tip-tilt coronagraphic image from each one to eliminate speckle noise in order to evaluate residual intensity due to only the tip-tilt error. As can be seen in the results, the residual intensity can be well suppressed by the EOPM coronagraph because of its fourth-order behavior.

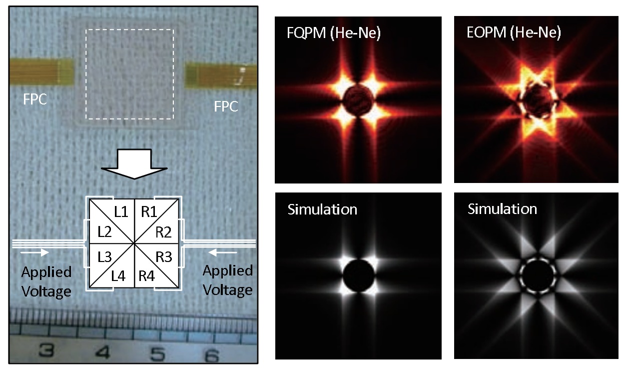

Figure 2: A manufactured liquid-crystal phase-mask, and acquired and numerically simulated Lyot-stop images of FQPM- and EOPM-mode.

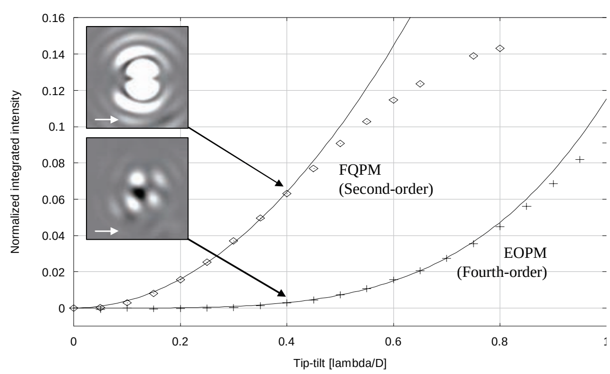

Figure 3: Residual intensity of FQPM and EOPM coronagraphs as a function of a tip-tilt error. Coronagraphic images for 0.4 λ/D tip-tilt error are also shown.

References

[1] Murakami, N., et al.: 2008, *PASP*, **120**, 1112.
[2] Rouan, D., et al.: 2000, *PASP*, **112**, 1479.

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Variation of the Subhalo Abundance in Dark Matter Halos

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Moore et al. (1999) and Klypin et al. (1999) calculated the evolution of galaxy-scale dark mater halos using high resolution cosmological *N*-body simulations. They found that dark matter halos of the mass comparable to the Local Group contained far too many subhalos compared to the number of known dwarf galaxies in the Local Group. In the case of dark matter halos of the size of typical clusters of galaxies, thetheoretical prediction and observation agreed pretty well. The theoretical prediction for galaxy-sized and cluster-sized halos are similar, and observations of clusters of galaxies and that of Local Group are very different [1, 2]. This discrepancy is now called "the missing dwarf problem".

We analyzed the statistics of subhalo abundance of galaxy-sized and giant-galaxy-sized halos formed in a high-resolution cosmological simulation of a 46.5 Mpc cube with the uniform mass resolution of $10^6 M_\odot$. We analyzed all halos with mass more than $1.5 \times 10^{12} M_\odot$ formed in this simulation box. The total number of halos was 125. We found that the subhalo abundance shows large halo-to-halo variations. The results of recent ultra-high-resolution runs fall within the variation of our samples. We found that the concentration parameter and the radius at the moment of the maximum expansion show fairly tight correlations with the subhalo abundance. This correlation suggests that the variation of the subhalo abundance is at least partly due to the difference in the formation history. Halos formed earlier have smaller number of subhalos at present [3, 4].

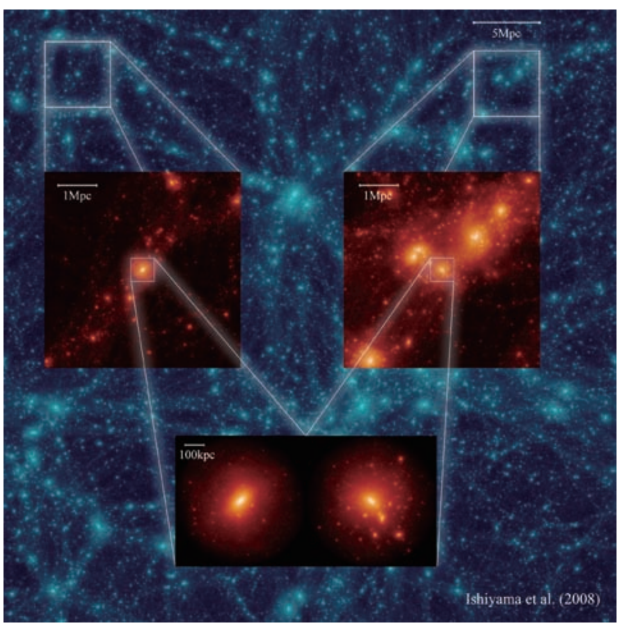

Figure 1: Snapshot ($z = 0$).

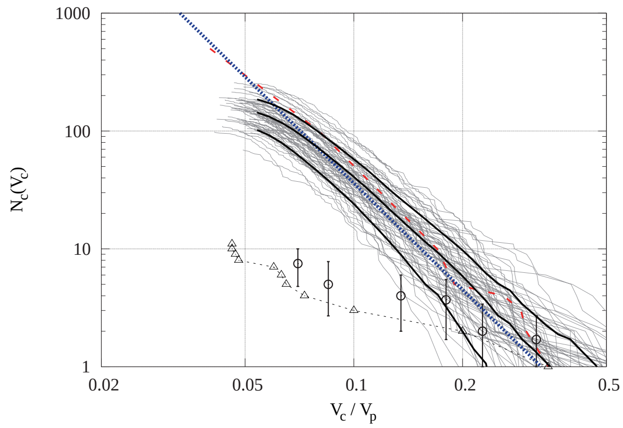

Figure 2: Cumulative numbers of subhalos as a function of their maximum rotation velocities V_c normalized by those of the parent halos V_p for 68 galaxy-sized halos with $1.5 \times 10^{12} M_\odot \leq M < 3 \times 10^{12} M_\odot$. Three thick solid curves show the average (middle) and $\pm 1\sigma$ values (top and bottom). Red line are the result of [2] for a galaxy-sized halo. The thin dashed curve with open triangles denotes the number of dwarf galaxies in our galaxy. The open circles with error bars show the number of dwarf galaxies in the Local Group.

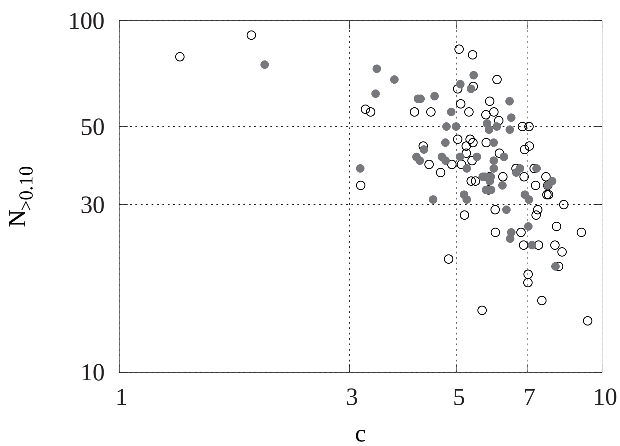

Figure 3: Dependence on the concentration parameter c of the subhalo abundance. More centrally concentrated halos are generally formed earlier.

References

[1] Klypin, A., et al.: 1999, *ApJ*, **522**, 82.
[2] Moore, B., et al.: 1999, *ApJL*, **524**, L19.
[3] Ishiyama, T., et al.: 2008, *PASJ*, **60**, L13.
[4] Ishiyama, T., et al.: 2009, *ApJ*, **696**, 2115.

Tycho's Supernova is of Type Ia
~Super explosion in 16th century caught by Subaru in 21st century~

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On the evening of 11 November 1572, Tycho Brahe, a Danish astronomer observed a bright star in the constellation Cassiopeia, outshining even Venus. He studied the brightness and color of the "new star" until March 1574 when it faded from view. On the basis of historical records of the light curve and colour evolution, it has been interpreted as a type Ia supernova of either a normal or somewhat overluminous type or of a subluminous type. Core-collapse supernovae of type Ib or II-L have also been suggested to be compatible with the light curve, however the determination of the exact supernova type has not been possible without spectroscopic information.

We started to observe the identified light-echo fields of SN 1572 using the 2.2-m and 3.5-m telescopes at the Calar Alto Astronomical Observatory, on 23 August 2008 and 2 September 2008, and found a bright and extended nebulosity with a peak surface brightness of R = 23.6 ± 0.2 mag arcsec^{-2} (Figure 1a).

The region was re-observed using the Faint Object Camera And Spectrograph (FOCAS) at the Subaru 8.2-m telescope on Mauna Kea, Hawaii, on 24 September 2008 (Figure 1b). The peak of the emission, with a surface brightness of R = 23.5 ± 0.2 mag arcsec^{-2} has again shifted away from SN 1572. A long-slit spectrum of the brightness peak of the echo structure was obtained with FOCAS on the same night, covering the wavelength range from 3,800 to 9,200 Å with a spectral resolution of 24 Å. The acquired echo spectrum unambiguously shows light of a supernova origin (Figure 2), a number of broad absorption and emission features from neutral and singly ionized intermediate mass elements. Type I supernovae are distinguished from those of type II by the absence of hydrogen, and type Ia supernovae are further distinguished from types Ib and Ic by a prominent Silicon 6,355 Å absorption feature at maximum light. We have compared the spectrum of SN 1572 with thermonuclear supernovae of different luminosity. Both sub- and overluminous type Ia supernovae, such as SN 1991bg and SN 1991T, respectively, showed peculiarities in their spectra near maximum light. We concluded that SN 1572 belongs to the majority class of normal type Ia supernovae [1].

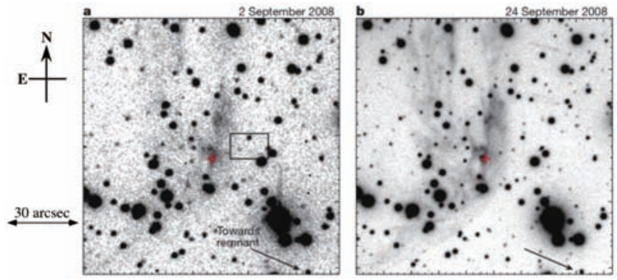

Figure 1: (a) Optical R-band images of the Tycho 's supernova light echo taken by Calar Alto 3.5 m telescope (black means bright). The rectangle shown in a indicates the location of a previous light-echo detection in 2006. The vector towards Tycho's supernova remnant is indicated (arrow). (b) R-band images taken by FOCAS on Subaru Telescope.

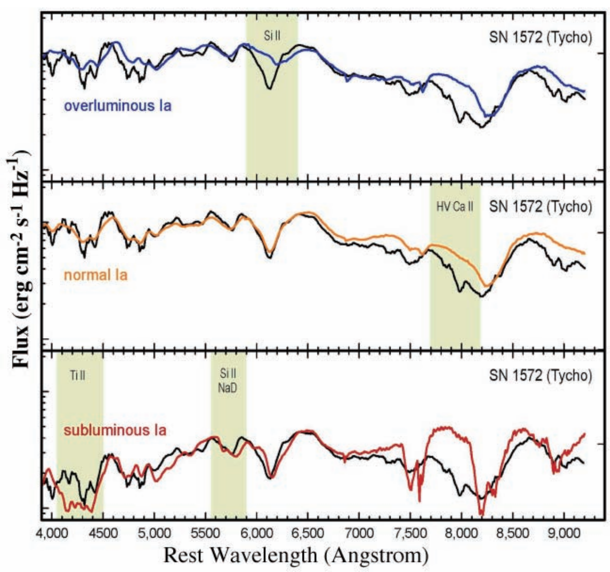

Figure 2: Spectrum of Tycho's supernova obtained by FOCAS. Black solid lines show the spectrum of Tycho's SN. Comparison with templates of subluminous (red), normal (orange) and overluminous (blue) type Ia supernova.

Reference

[1] Krause, O., et al.: 2008, *Nature*, **320**, 1195.

Supernova Remnant Cassiopeia A: Decoding Light to Uncover the Mystery of its Birth

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The supernova remnant Cassiopeia A (Cas A) is one of the most-studied objects in the sky, with observations from the longest radio waves to gamma rays. The lack of a definitive sighting means that there is almost no direct information about the type of the explosion, and the true nature of its progenitor star has been a puzzle since the discovery of the remnant. There is no chance to see the precise date when it happened, or how it looked like at the time of the outburst. The outburst supposedly happened in approximately 1680, judging from the current expansion rate. It is a mystery, however, why there is no widely recorded sighting of such an extravagant outburst in the 17th century, happened just 11,000 light years away form the earth. The light echo is a phenomenon that the wave of light is reflected or re-emitted by the material located away from its origin, and arrives to the observer with a delay. The light echo of Cas A we see today is therefore the light of the outburst that arrived on the earth 300 yrs after the direct light sweeps out the planet. No need to say, this light echo hides the secret of the birth of Cas A within. We started regular patrols of the region by Spitzer Space Telescope in the infrared wavelength, and wide field monitoring observation by MPIA Calar Alto 2.2 m telescope in Spain. The candidates were found in September 2007.

On the night of 9 October 2007, the light echo (R = 23.5 mag) was confirmed with FOCAS (Fig. 1), and we started the spectroscopy. After 5.5 hours exposure, we got a spectrum showing the clear spectral lines, the finger prints of a very young SN (Fig. 2). Comparing with the data in the spectral database of various supernovae, we found that the spectra of the light echo is almost identical with that of SN 1993J (Fig. 2). The progenitor of Cas A must be the same with that of SN1993J: a red super giant more massive than 10 times of the solar mass. And they went through the same type of outburst: Type IIb. A supernova outburst of the type IIb is relatively faint ($M_V = -17.5$) and fades away fast. Unfortunate weather of mere several days, that somehow overlapped with the maximum of the light curve, would be enough to let this young supernova escaped away from the history. At a relatively faint brightness, the light of the Cas A supernova event would have been extinguished relatively quickly by the dust grains in the foreground of the expanding supernova remnant along with the characteristically fast decay of light from a Type IIb outburst. With these findings, the answer to our historical puzzle seems to be finally obtained.

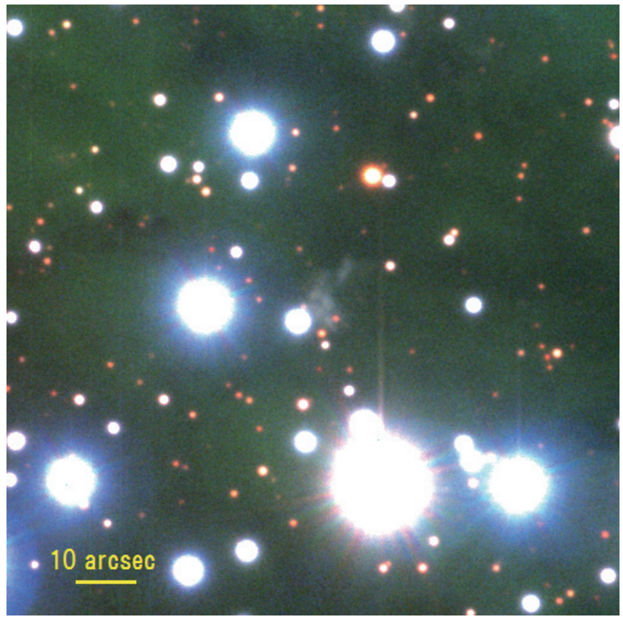

Figure 1: Optical image of the echo region. It is a color composite of I-band (red), R-band (green), and V-band (blue) by FOCAS at Subaru Telescope. The faint white features in the middle of the image are the light echoes.

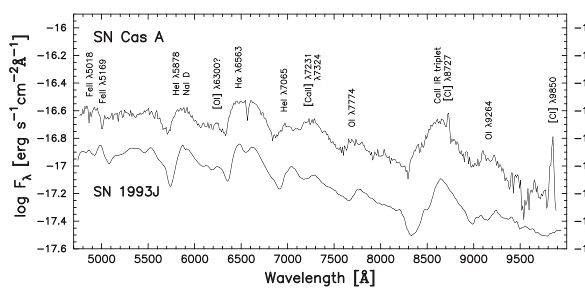

Figure 2: Spectrum of the Cas A supernova (upper) taken by FOCAS on 9 October 2007 and SN 1993J for a reference (bottom).

Reference

[1] Krause, O., et al.: 2008, *Science*, **320**, 1195.

Detections of Strong Ionizing Radiation from High-redshift Galaxies

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Ionizing radiation from star-forming galaxies is a likely primary source of cosmic reionization. Although the emissivity of Lyman continuum (LyC) from galaxies is a key to evaluate the contribution of galaxies to cosmic reionization, it has been poorly constrained due to the fact that LyC photons are easily absorbed by the intergalactic medium (IGM). Since direct observation of LyC at $z > 4$ is virtually impossible because of a rapid increase in the number density of Lyman limit systems toward high redshifts, we must focus on $z \sim 3$ where the IGM optical depth is still about unity on average. So far the number of galaxies with direct observation of LyC was too small to reveal the typical LyC emissivity. It is because the spectroscopy for LyC search requires much observing time for each target galaxy, and the number of galaxies observed was limited.

In order to confront this issue, we adopted a novel technique: imaging observation with a narrow-band filter to trace the LyC from galaxies at a specific redshift enables us to examine LyC from a large number of galaxies simultaneously. The target field of the present study is the SSA22 field where the prominent proto-cluster of galaxies at $z = 3.09$ has been discovered, and there are 198 galaxies with spectroscopic redshifts in one Subaru / Suprime-Cam field. We fabricated a special narrow-band filter NB359 (central $\lambda = 359$ nm with FWHM = 15 nm) to examine LyC from these $z \simeq 3.1$ galaxies, and executed observation in Sep. 2007.

We detected 7 Lyman break galaxies (LBGs) and 10 Lyman α emitters (LAEs) in NB359 among 198 galaxies with spectroscopic redshifts ([1]; Fig. 1). There are some objects with significant spatial offsets between LyC and non-ionizing UV radiation.

In Figure 2 colors of the detected galaxies are plotted. NB359-R color stands for the ratio of LyC and nonionizing UV radiation, while $V\!-\!i'$ color represents UV slope. Most LAEs have NB359-R color bluer than LBGs. We also show predicted colors of model spectral energy distribution generated by the population synthesis code with Salpeter initial mass function, low metallicity and zero age. The colors which can be reproduced by considering dust and IGM attenuation are indicated with the shaded area. Because increasing age or metallicity make NB359-R color redder, the colors of detected galaxies (especially LAEs) cannot be explained with such standard stellar populations. This result would indicate the existence of strong sources of ionizing radiations among high redshift star-forming galaxies, which might be a counterpart of galaxies in the cosmic reionization epoch. Further investigation including deep spectroscopy is required to clarify the nature of such strong LyC emitters.

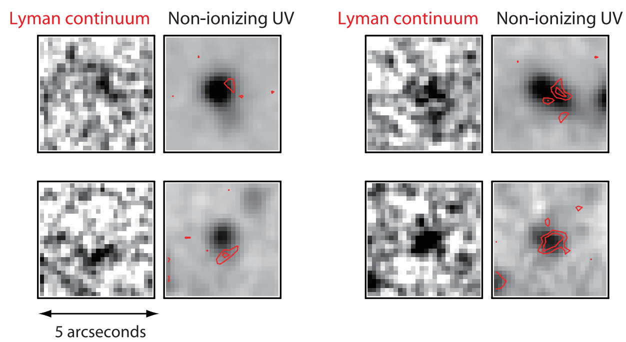

Figure 1: Examples of galaxies with LyC detection. In UV (R-band) images contours of NB359 images are overplotted.

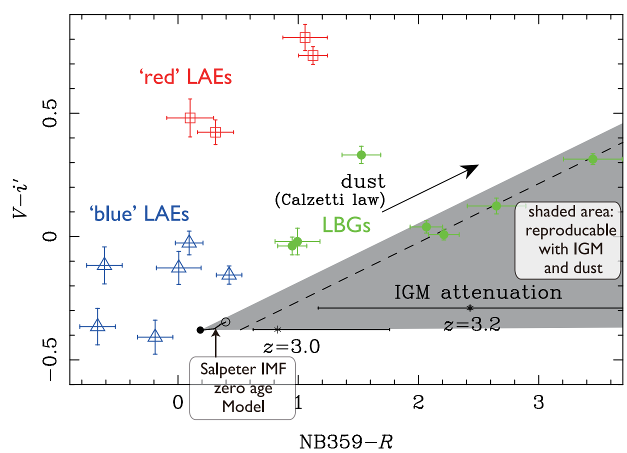

Figure 2: NB359-R and $V\!-\!i'$ colors of galaxies with LyC detection.

Reference

[1] Iwata, I., et al.: 2009, *ApJ*, **692**, 1287.

Okayama Astrophysical Observatory has discovered ten exoplanets

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Since the first discovery of the extrasolar planet in 1995, more than 300 extrasolar planets have been discovered so far. While most of them orbits around FGK dwarfs (0.7–1.5 $M_\odot$), so-called solar-type stars, about 20 planets orbit around GK-type giants (1.5–4 $M_\odot$). Such intermediate-mass stars are unsuitable for Doppler planet searches when they are on the main sequence (early-type stars) because they have few absorption lines in their spectra, which are often rotationally broadened, and thus it is difficult to attain high precision in radial velocity measurements. On the other hand, late-G to early-K type giants, which are evolved from early-type dwarfs, have many sharp absorption lines in their spectra appropriate for precise radial velocity measurements due to low surface temperature and small rotational velocity. Thus, giant stars are now regarded as ideal targets for planet searches around intermediate-mass stars.

Since 2001 we have been carrying out a Doppler planet search program targeting about 300 GK giants using the 1.88 m telescope and HIgh Dispersion Echelle Spectrograph at Okayama Astrophysical Observatory. We discovered seven new planets in 2008 from the program [1, 2]. The planets have minimum masses of 1.6–10 $M_{\rm JUP}$, semimajor-axes of 0.7–2.6 AU, and eccentricities of 0 –0.2. Their host stars have masses of 1.6–2.7 $M_\odot$. The number of our discoveries reached at 10, which is about a half of the currently known planets around giant stars.

One of the interesting properties of planets around giants is paucity of inner planets. All of the known planetary companions to giant stars orbit beyond 0.7 AU and no planets have been found within the limit. Two scenarios can account for the orbital distribution; one is that inner planets are primordially deficient around intermediate-mass stars and the other is that they have been engulfed by the expanding central stars due to stellar evolution. When we assume that many of clump giants are post-RGB stars (core-helium-burning stars), planets in orbits with $\lesssim 0.5$ AU could have been engulfed by the central stars at the tip of RGB ($R_{\rm star} \sim$ 25–40 $R_\odot$ for a 2–3 $M_\odot$ star) due to tidal force from the central stars. It means that we can not reject the possibility that planets had originally existed in short orbital distances around progenitors of clump giants. Other interesting properties of planets to giants, such as higher frequency of super-massive planets with $\gtrsim 5\,M_{\rm JUP}$ compared to the case of solar-type stars and lack of metal-rich tendency in planet-host giants, have begun to emerge [3]. We try to increase the number of targets and detected planets further in order to confirm their statistical properties.

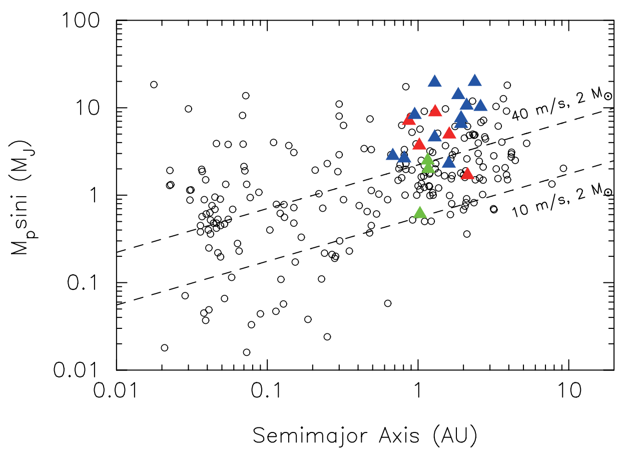

Figure 1: Planet mass plotted against semimajor axis. Planets around low-mass (< 1.6 $M_\odot$) giants, intermediate-mass subgiants (1.6–1.9 $M_\odot$), and clump giants (1.7–3.9 $M_\odot$), are plotted by red, green, and blue triangles, respectively. Planets around solar-type dwarfs are plotted by open circles. Dashed lines express detection limits with velocity semiamplitude of 10 m s^{-1} and 40 m s^{-1} around a 2 $M_\odot$ star. Since giants have intrinsic variability in radial velocity of 10–20 m s^{-1} due to stellar activity, it is difficult to detect planets which impart velocity variations less than 40 m s^{-1} to central stars.

References

[1] Sato, B., et al.: 2008, *PASJ*, **60**, 539.
[2] Sato, B., et al.: 2008, *PASJ*, **60**, 1317.
[3] Takeda, Y., Sato, B., Murata, D.: 2008, *PASJ*, **60**, 781.

Fe XIII Density Diagnostics in the EIS Observing Wavelengths

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The EUV Imaging Spectrometer (EIS) on board the *Hinode* satellite observes solar emission lines at EUV wavelengths with high spatial and spectral resolution [1]. The two wavelength bands observed with EIS are 170 –210 Å and 250–290 Å, and include emission lines of Heii and a wide range of iron ions from Feviii through to Fe XXIV, formed in the temperature range $4.7 \leq \log T_e \leq 7.2$.

Among the emission lines of the various iron species, the Fe XIII lines found in the EIS short wavelength band (170–210 Å) are particularly important, as they provide several line pairs sensitive to the density of the coronal plasma. As an independent parameter to the emission measure, the density is crucial to determining the plasma filling factor, i.e., the fraction of the observed plasma volume that is emitting radiation.

The diagnostic capability of Fe XIII line features seen in the EIS observing wavelengths has been studied. Full CCD slit spectra of the EIS first-light active region AR 10921 observed in the short wavelength band (170 Å–210 Å) are used to provide a dataset of Fe XIII emission lines, and their intensities are compared with two theoretical models for density diagnostics: The first is a modification of the CHIANTI v5.2 model [2] that is modified to use the Gupta-Tayal (1998) [3] electron collision file, and the second is the model of Yamamoto et al. (2008) [4] (hereafter Y08) that uses the electron collision data of Aggarwal and Keenan (2005) [5].

Derived electron densities are plotted against the position along the slit in Figure 1. In the density range from $10^{8.5}$ to $10^{9.5}$ cm^{-3} the four density diagnostic line pairs; λ96.5 Å, λ200.0 Å, λ203.2 Å, and λ203.8 Å vs λ202.0 Å give consistent densities. These are all strong lines appearing in the EIS waveband except λ203.2 Å. The Y08 model gives slightly better consistency between the ratios than the modified CHIANTI model for these strong line pairs.

For other Fexiii lines we find problems with both of the theoretical models: from the Y08 model, λ204.3 Å and λ209.6 Å are not well predicted; while for the modified CHIANTI model λ204.3 Å and λ204.9 Å are inconsistent with observations. They are generally weak lines seen in the EIS waveband, and the problems with the λ209.6 Å and λ209.9 Å may be partly due to the instrument calibration, as they lie very close to end of the EIS waveband.

The accuracy of the high density limit of the important λ203.8 Å/λ202.0 Å density sensitive ratio has also been investigated, using an EIS observation of a C-class flare from on 2007 January 16. The measured ratio is consistent with the theoretical predictions both from the Y08 and modified CHIANTI models.

Watanabe et al. (2009) [6] describe the detail of the analysis.

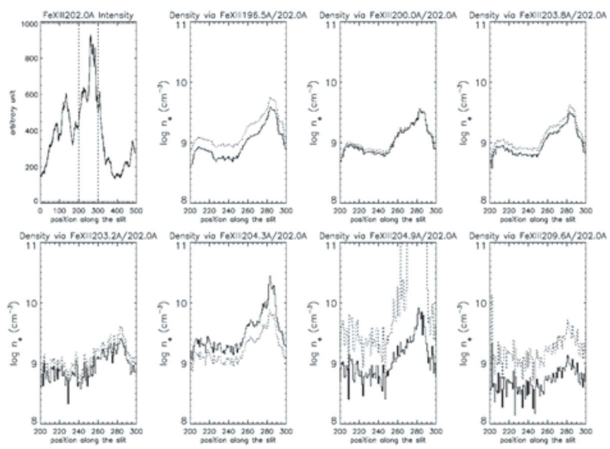

Figure 1: Densities derived from observed line ratios at the positions (pixel numbers: 200–300) along the slit. Total intensity of Fe XIII λ202.0 Å is plotted in the top-left panel. Solid lines are for the model of Y08 and dotted lines are for the CHIANTI.

References

[1] Culhane, J. L., et al.: 2007, *Sol. Phys.*, **243**, 19.
[2] Landi, E., et al.: 2006, *ApJ*, **162**, 261.
[3] Gupta, G. P., Tayal, S. S.: 1998, *ApJ*, **506**, 464.
[4] Yamamoto, N., et al.: 2008, *ApJ*, **689**, 646.
[5] Aggarwal, K. M., Keenan, F. P.: 2005, *ApJ*, **429**, 1117.
[6] Watanabe, T., et al.: 2009, *ApJ*, **692**, 1294.

Laser interferometric high-precision geometry monitor for JASMINE

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A heterodyne metrology interferometer was stabilized down to a noise level of 20 picometers (pm) as a rootmean- square (RMS) value integrated between 0.3 mHz and 1 Hz. This interferometer can be used in precise metrology applications, such as characterization of deformation for satellite optical components against thermal exposure.

JASMINE (Japan Astrometry Satellite Mission for Infrared Exploration) [1] is one of next-generation astrometry satellite missions and aims to measure parallaxes, positions and proper motion with the precision of 10 microarcsec for ten million stars in the bulge of the Milky Way. Now, we are developing small-JASMINE, which is a downsized version of JASMINE and planed to be launched around 2015. In order to realize high-precision astrometric observation, geometry of a small-JASMINE telescope with the structure size of approximately 1 m should be stabilized with an accuracy of 100 pm in RMS value for a frequency range from 1 mHz to 1 Hz. In order to ensure such requirement by ground experiments, thermal deformation properties of telescope materials should be measured with the same accuracy under the similar environment to space. A heterodyne metrology interferometer can be used as a high-precision displacement sensor for such a laboratory test. Then, we had begun to develope a heterodyne metrology interferometer [2] and stabilized it so as to verify that a noise level satisfies the requirement for small-JASMINE.

A conceptual design of our heterodyne metrology interferometer is shown in Fig. 1. The heterodyne interferometer was built on a 50 mm square ultra-low expansion glass plate (OHARA, CLEARCERAM® -Z) in order to reduce an optical path length change caused by temperature variation. Optical components are bonded to the glass plate by hydroxide-catalysis bonding so as to make the whole structure virtually monolithic. An optical configuration of the interferometer is a Mach-Zehnder interferometer with a design as symmetric as possible so that a detection signal can be insensitive to homogeneous thermal expansion of the glass plate. The heterodyne frequency is actively controlled in order to suppress residual noises that are caused by optical path length changes outside of the glass plate as well as phase fluctuations of the heterodyne frequency source. This configuration allowed us to concentrate our effort for stabilization only at a 50 mm square optical base plate.

Figure 2 shows the power spectrum density and the RMS of the displacement measured by the stabilized interferometer. The displacement RMS noise level is 20 pm for the frequency range from 1 Hz to 1 mHz. This meets the requirement for small-JASMINE.

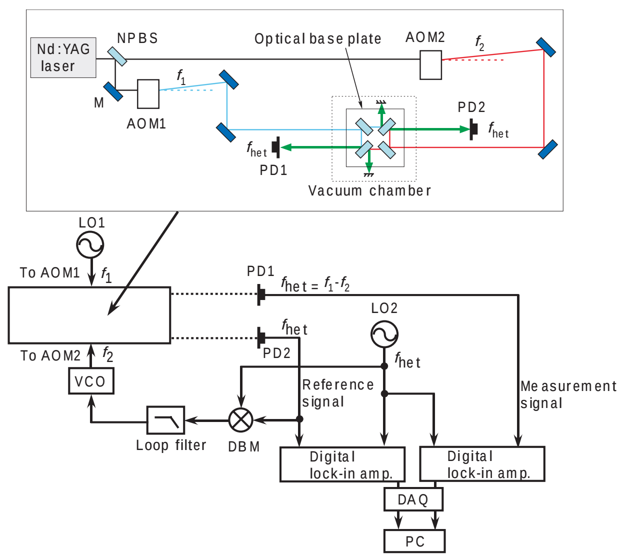

Figure 1: Schematic drawing of a heterodyne interferometer.

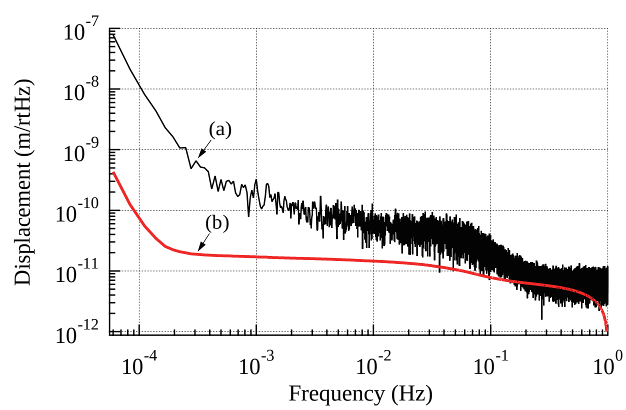

Figure 2: The displacement noise level of the stabilized interferometer: (a) the power spectrum density, (b) the RMS.

References

[1] Gouda, N., et al.: 2008, *Proc. of IAU Symp.*, **248**, 248–251.
[2] Niwa, Y., et al.: 2008, *SPIE*, **7018**, 70183D-1–70183D-12.

Three-dimensional Simulation of Magnetized Cloud Fragmentation Induced by Nonlinear Flows and Ambipolar Diffusion

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We demonstrate that the formation of collapsing cores in subcritical clouds is accelerated by nonlinear flows, by performing three-dimensional non-ideal MHD simulations [1]. (In the subcritical clouds, magnetic force suppress the gravitational collapse unless the magnetic diffusion works.) This is the first 3D simulation that would alter the previous estimation of the starformation time scale.

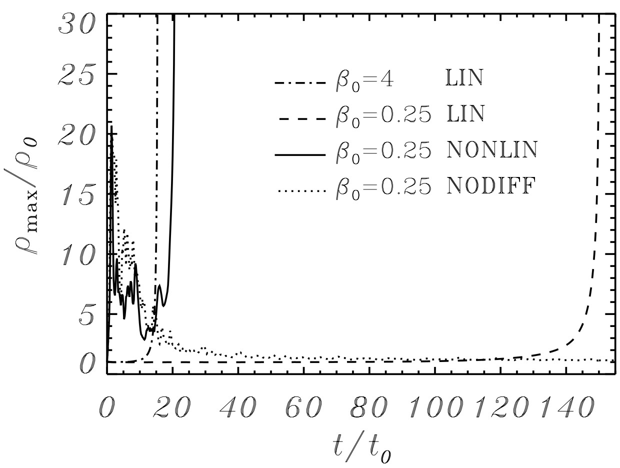

Figure 1: The time evolution of maximum densities at z = 0. The solid line shows the evolution for an initially nonlinear supersonic perturbation and β_0 = 0.25 (see Fig. 2). The dashed line (β_0 = 0.25) and the dash-dotted line (β_0 = 4) show the evolution for models with a linear initial perturbation as calculated by Kudoh et al. (2007) [2]. The dotted line shows the evolution for an initially nonlinear supersonic perturbation and β_0 = 0.25, but without ambipolar diffusion. The time unit t_0 is about 2.5 × 10^5 years in this model.

An initial random supersonic (and trans-Alfvénic) turbulent-like flow is input into a self-gravitating gas layer that is threaded by a uniform magnetic field (perpendicular to the layer) such that the initial mass-to-flux ratio is subcritical. (In this model, the subcritical means $\beta_0 < 1$, where β_0 is the initial ratio of gas to magnetic pressure at z = 0.) Magnetic ambipolar diffusion occurs very rapidly initially due to the sharp gradients introduced by the turbulent flow. It subsequently occurs more slowly in the traditional near-quasistatic manner, but in regions of greater mean density than present in the initial state. The overall timescale for runaway growth of the first core(s) is several $\times 10^6$ yr, even though previous studies have found a timescale of several $\times 10^7$ yr when starting with linear perturbations and similar physical parameters (Fig. 1, 2).

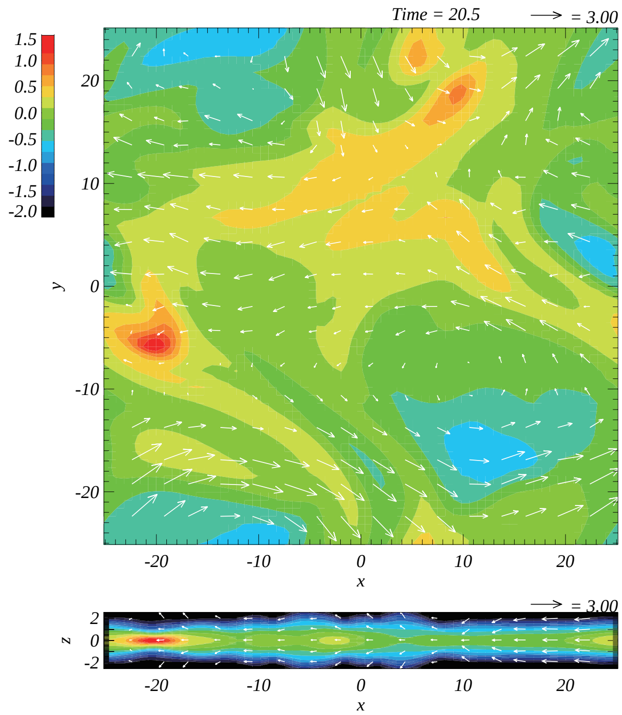

Figure 2: Logarithmic density image at $t = 20.5\,t_0$ for the nonlinear perturbation case of the subcritical cloud (β_0 = 0.25). The top panel shows the cross section at z = 0, and the bottom panel shows the x–z cross section at $y = -5.9\,H_0$, where H_0 is the scale height of the gas layer ($H_0 \sim$ 0.05 pc). A collapsing core is formed in the vicinity of $x = -20\,H_0$ and $y = -6H_0$.

Large-scale supersonic flows exist in the cloud and provide an observationally testable distinguishing characteristic from core formation due to linear initial perturbations. However, the nonlinear flows have decayed sufficiently that the relative infall motions onto the first core are subsonic, as in the case of starting from linear initial perturbations. The ion infall motions are very similar to those of neutrals; however, they lag the neutral infall in directions perpendicular to the mean magnetic field direction and lead the neutral infall in the direction parallel to the mean magnetic field.

References

[1] Kudoh, T., Basu, S.: 2008, *ApJ*, **679**, L97.
[2] Kudoh, T., et al.: 2007, *MNRAS*, **380**, 499.

How was the mushroom-shaped GW 123.4–1.5 formed in the Galactic disk?

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GW 123.4–1.5 is a mushroom-shaped HI structure composed of a stem and a cap and is dissimilar to any common shells or chimneys in our Galactic disk. To understand the origin and velocity structure of GW 123.4–1.5, we extend the previous two-dimensional hydrodynamical simulation [1] of the collision of a high-velocity cloud (HVC) with the Galactic disk to three dimensions [2].

Figure 1 shows the evolution of column-density on the *x*–*z* plane (integrating along the *y*-axis) for model O3 (the angle from the vertical axis of the Galactic disk is 3°, the number density is 0.1 $\mathrm{cm^{-3}}$, and the incident speed is 100 $\mathrm{km\,s^{-1}}$). We can find the mushroom-shaped structures between t = 56 Myr (or t/t_0 = 4.0) and t = 67 Myr (or t/t_0 = 4.8). The height of the mushroom at the age of t = 67 Myr is about 350 pc, which is the same size as that of GW 123.4–1.5. The lifetime of the mushroom structure is ~10^7 yr and the width ratio of the cap to the stem is about 3:1. The mass of the cap is about twice that of the stem, and the total mass is estimated to be ~$10^5 M_\odot$. The mean column-density contrast between the mushroom and ambient medium is about 2:1. Although the mass ratio is a little smaller than the observed one 4:1, most physical parameters of the mushroom-shaped structure in model O3 coincide with those of GW 123.4–1.5.

Figure 2 shows the column-density and the position-velocity maps, which are equivalent to the observational longitude-velocity (*l*–*v*) maps, for model O3. The velocity gradient in Figure 2b is very similar to the observed value of GW 123.4–1.5.

GW 123.4–1.5 is expected to be formed by the almost head-on collision of a HVC with velocity ~100 $\mathrm{km\,s^{-1}}$ and mass ~$10^5 M_\odot$ about 5×10^7 yr ago. A mushroomshaped structure like GW 123.4–1.5 must be infrequent on the Galactic plane, because the head-on collision which explains the mushroom structure seems rare for observed HVCs. HVC-disk collision explains not only the origin of the mushroom-shaped structure but also the formation of a variety of structures like shells, loops, and vertical structures in our Galaxy.

References

[1] Kudoh, T., Basu, S.: 2004, *A&A*, **423**, 183.
[2] Baek, C. H., Kudoh, T., Tomisaka, K.: 2008, *ApJ*, **682**, 434.

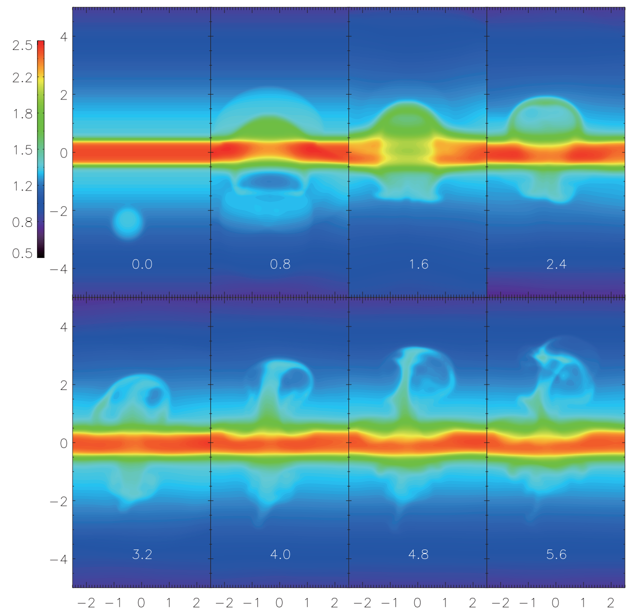

Figure 1: Time evolution of column-density of cool gas on the *x*–*z* plane (integrating along the *y*-axis). The snapshots are made at t/t_0 = 0, 0.8, 1.6, 2.4 (top: left to right), 3.2, 4.0, 4.8, and 5.6 (bottom: left to right) for model O3.

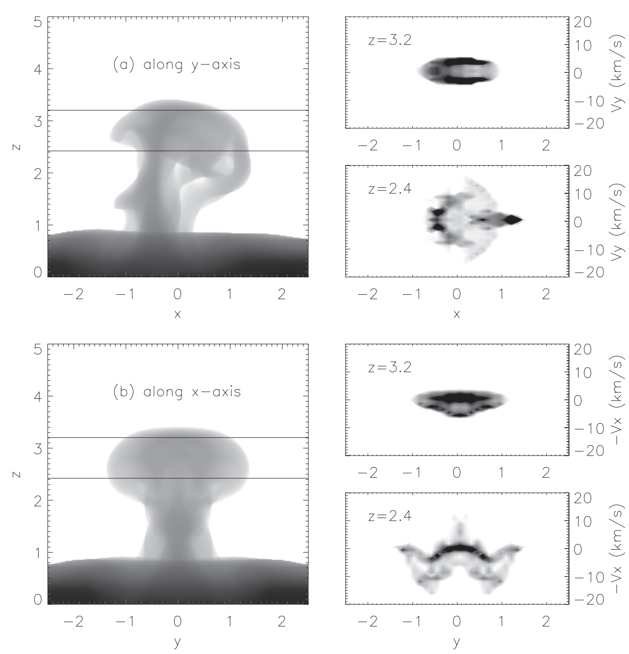

Figure 2: Column-density (left panels) and position-velocity (right panels) at t/t_0 = 4.8 in model O3. Position-velocity is measured for the lower ($z = 2.4\,H_0$) and upper ($z = 3.2\,H_0$) regions of the caps on (a) the *x*–*z* plane (along the *y*-axis) and on (b) the *y*–*z* plane (along the *x*-axis).

* Chang Hyun Baek was invited to NAOJ as a Post-Doctoral Fellow by Korea Research Foundation from October 2006 to September 2007.

Development of a hybrid N-body simulation code for planet formation process that can handle number of large particles

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In the standard model of planet formation scenario proposed by Hayashi et al., planetesimals evolve to protoplanets through mutual collisions. N-body simulations have been used for the study of this process, and the formation mechanisms such as the runaway growth and the oligarchic growth have been found. In previous studies, the number of particles have been limited to around 10^4, and therefore minimum particle mass used was around 10^{23} g. However, we need to examine the behavior of small planetesimal, since it is believed that planetesimals of the mass 10^{16}–10^{19} g are first formed from dust. Moreover, because there is a limitation in the number of particles that can be handled, in almost all N-body simulations the assumption of perfect accretion has been used. This assumption is not appropriate for the process of the planet growth in the late stage. Thus a simulation code that can handle a large number of particles is necessary to study these problems. It can also handle fragmentation that increases the number of planetesimals.

In N-body simulations, the calculation cost increases as the second power of the number of particles. Moreover, in planet formation simulations, since the formation time (10^6–10^7 years) is far longer than the orbital timescale of planetesimals, very long calculations are necessary. We developed a high speed simulation code that can handle a large number of particles. Since gravity decrease as the inverse square of the distance, distant particles are organized to calculate gravity with keeping calculation cost lower. In addition, it can integrate with long time steps, because gravity of distant particles have smaller time variation than that of near particles. Hence, we can calculate with high accuracy while keeping low calculation cost and time.

Specifically, we split the mutual gravity of particles as the distance [1]. The gravity can be divided into gravity of near particles with rapid variation and that of distant particles with slow variation. Moreover, the distant particle gravity is calculated by the tree method [2], because it is relatively small compered to the solar gravity and forces from nearby particles gravity. They are calculated by the fourth Hermite scheme with small and individually variable time steps. It can integrate at high speed while keeping high accuracy by combining these methods [3]. Figure 1 shows the relative energy error as a function of time. The energy error changes randomly, so this code can integrate the system with small error for long calculations. The calculation cost of this code is about factor 60 smaller than conventional direct calculating code for 10^4 particles. Therefore, for 10^6 particles our code is 6000 times faster than the direct calculation. Then we can calculate over 10^6 particles.

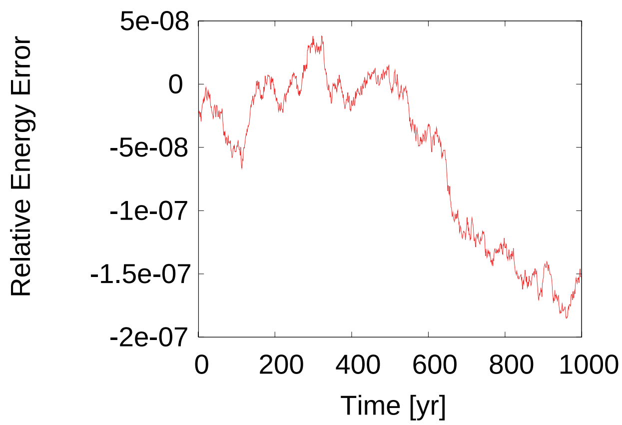

Figure 1: Relative energy error as a function of time.

References

[1] Chambers, J. E.: 1999, *MNRAS*, **304**, 793.
[2] Barnes, J., Hut, P.: 1986, *Nature*, **324**, 446.
[3] Fujii, M., et al.: 2007, *PASJ*, **59**, 1095.

Wide-Field Infrared Imaging Polarimetry of the NGC 6334 Region: A Nest of Infrared Reflection Nebulae

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We report the detection of eighteen infrared reflection nebulae (IRNe) in the *J*, *H*, & *Ks* linear polarimetric observations of the NGC 6334 massive star-formation complex [1], a total bolometric luminosity ~ $1.9 \times 10^6 L_\odot$ [2], of which 16 IRNe are new discoveries. Our images cover ~180 square arcminutes, one of the widest near-infrared polarization data in star-formation regions so far. These IRNe are most likely associated with embedded young OB stars at different evolutionary phases, showing a variety of sizes, morphologies, and polarization properties, which can be divided into four categories of Type A to D. We argue the above classification can be placed along the approximate evolutionary sequence, i.e., Type A is the youngest and evolve into D through B and C.

We suggest that the difference of the polarized patterns reflects the evolutionary sequence of IRNe; the youngest IRNe with well aligned polarization (*Type A*) evolve into monopolar/bipolar IRNe with roughly centrosymmetric polarization (*Type B*). When IRNe have concentric polarizations (*Type C*), the illuminating sources create HII regions, and then, IRNe become less distinct near the central sources with a centrosymmetric circular pattern at the region of the ionization boundary (*Type D*). We note, however, that care must be taken to infer above conclusions from the polarization pattern alone. Further high resolution radio observations for kinematical information should be undertaken to verify our IRN evolutionary hypothesis.

This research was partly supported by Grants-in-Aid for Scientific Research on Priority Areas from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and No.16340061, 16077204, and 16340061.

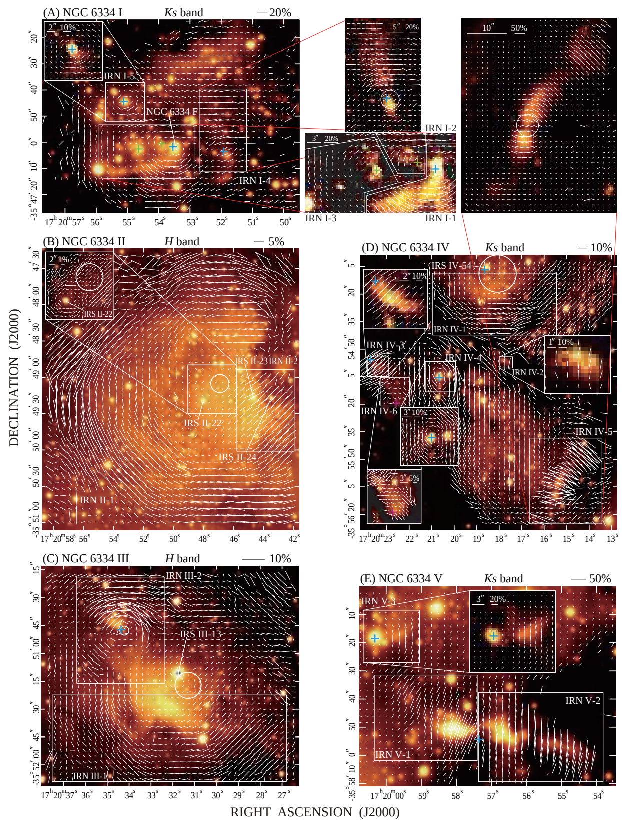

Figure 1: Polarization vectors are superposed on the intensity images in the *H* or *Ks* band. In the magnifications, except for IRN IV-6, the vectors are superposed on the polarized intensity images in the same band. The white square indicates each IRN, and the circle shows each position of the illuminating sources with 1σ error. Blue crosses represent the positions of *Spitzer* 8.0 μm sources, green crosses represent the MIR sources for IRN I-2 and 3, and purple cross represents the radio source for IRN IV-6. For IRN I-1, I-5, IV-4, and V-3, since illuminating sources are identified with NIR sources, the error circles are not marked.

References

[1] Hashimoto, J., et al.: 2008, *ApJL*, **677**, L39.
[2] Loughran, L., et al.: 1986, *ApJ*, **303**, 629.

New Constraint on Radiative Decay of Long-lived Particles with New ^{4}He Photodisintegration Data and Primordial ^{6}Li Problem

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Spectroscopic observations of metal-poor halo stars (MPHSs) indicate that abundances of ^{6}Li and ^{7}Li on the stellar surface are independent of the metallicity. The observed value of ^{7}Li is a factor of 2–4 smaller and that of ^{6}Li a factor of ~10^3 higher than predictions by standard big bang nucleosynthesis (BBN) model. The radiative decay of long-lived particles in the early universe could trigger through nonthermal processes production of ^{6}Li up to about ten times more than observed in MPHSs [1]. The photodisintegration of ^{4}He, which is involved in the nonthermal nucleosynthesis triggered by the radiative decay, was newly measured with precise quasimonochromatic laser-Compton photon beam [2]. They show smaller cross sections than deduced from previous experiments. We then calculate the decay-induced nonthermal nucleosynthesis with new cross sections fitted to the new experiment (Fig. 1) and derived a new constraint on the radiative decay (Fig. 2) [3].

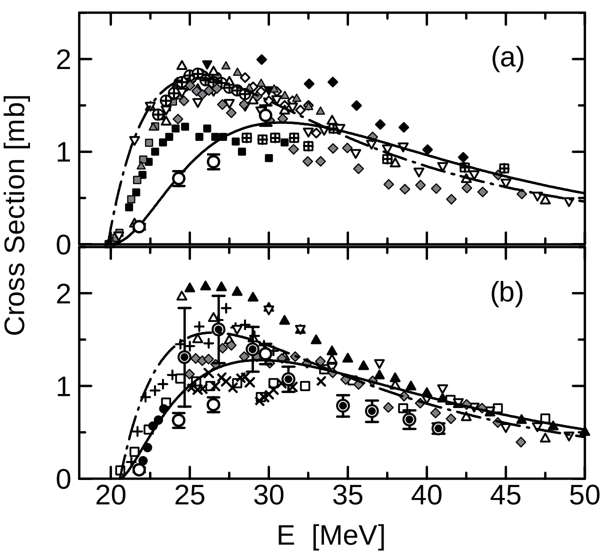

Figure 1: The cross sections of the ^{4}He(γ,p)^{3}H (a) and ^{4}He(γ,n)^{3}He (b) reactions as a function of the photon excitation energy E_γ. The open circles correspond to the new data from experiments with quasi-monochromatic laser-Compton photon beams [2]. The solid curves are the most probable excitation functions [3] while the dash-dotted curves the previous fitting functions [4]. This figure is reprinted from [3].

We calculate the non-thermal nucleosynthesis, and constrain the allowed parameter region for long-lived particles X, a lifetime τ_X and $\zeta_X = (n_X^0/n_\gamma^0)E_{\gamma 0}$. (n_X^0/n_γ^0) which is the number ratio of X to photon before X-decay and $E_{\gamma 0}$ is the photon energy emitted in the radiative decay. The change in cross sections of ^{4}He photodisintegration affects the yields of D, ^{3}He and ^{4}He, which are related to the ^{4}He photodisintegration at low energy (~30 MeV). The upper limit of allowed region of ζ_X for these nuclides shifts upward by ~ 300–30 % for τ_X = 10^6–10^{10} s accordingly. The nonthermal yield of ^{6}Li is not sensitive to the change in cross sections at low energy, since the ^{6}Li production is mainly through secondary processes which need energetic photons of $E_\gamma \geq 50$ MeV. We study a possible uncertainty in the cross sections at high energies associated with sum rules, and found that it causes a factor of ≤ 3 change in the constraint on the parameter ζ_X.

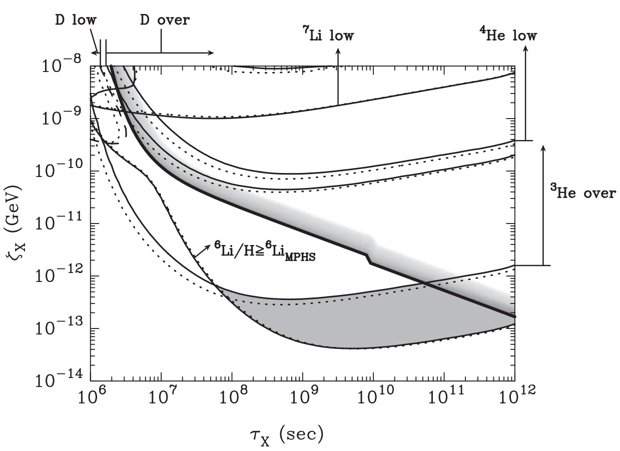

Figure 2: Contours corresponding to constraints on the primordial light element abundances for calculations with new cross sections of ^{4}He photodisintegration [3] (solid lines) and with the previous ones [4] (dotted lines). Overabundance (over) and underabundance (low) regions of D, ^{3,4}He and ^{7}Li are excluded from a comparison with observations. The region above the thick solid line is excluded by the consistency requirement of the background radiation with a black body. The grey region is the allowed region where ^{6}Li is produced more than observed in MPHSs. This figure is reprinted from [3].

References

[1] Kusakabe, M., et al.: 2006, *PRD*, **74**, 023526.
[2] Shima, T., et al.: 2005, *PRC*, **72**, 044004.
[3] Kusakabe, M., et al.: 2008, *PRD*, **79**, 123513.
[4] Cyburt, R. H., et al.: 2003, *PRD*, **67**, 103521.

Production mechanism of circular polarization in the ORION BN/KL region: Near-infrared circular polarimetry by SIRPOL

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We reported a deep K_S band circular polarization (CP) image of the Orion BN/KL region, a massive star-forming region [1, 2]. Further observations of CP from star-forming regions were necessary to reveal the production mechanism of CP.

This study is the first result of circular polarimetry by a polarimeter SIRPOL mounted on the IRSF 1.4 m telescope in South Africa. SIRPOL in CP mode saw first light in the end of 2006, after SIRPOL in linear polarization (LP) mode saw first light in the end of 2005.

Figure 1 shows the distribution of CP around the most massive star in this region, IRc2. This distribution has a quadrupolar structure of right- and left-handed CP. Figure 2 shows, for the first time, correlations of CP, linear polarization (LP), and H–K_S color representing extinction. These quality correlations were yielded from CP and LP [3] data which were obtained by the same instrument and telescope.

We theoretically derived a simple relation between dichroic extinction, color excess, CP, and LP. This derivation for a young stellar object was yielded by analysis of the basic equation of vector radiative transfer. This derived relation agreed with the observed correlation between the Stokes parameters and the color excess. This result suggests a major contribution of dichroic extinction to the production of CP in this region.

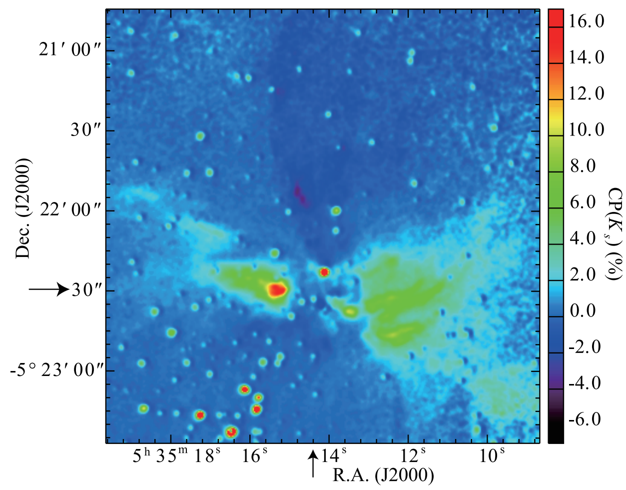

Figure 1: Image of the degree of CP (%) in the *Ks* band (2.14 μm) of the BN/KL region. The field of view is 2.′7 square. A positive sign for CP indicates that the electric vector is rotated counterclockwise in a fixed plane relative to the observer. The embedded massive star IRc2, which has about 25 solar masses, is indicated by arrows.

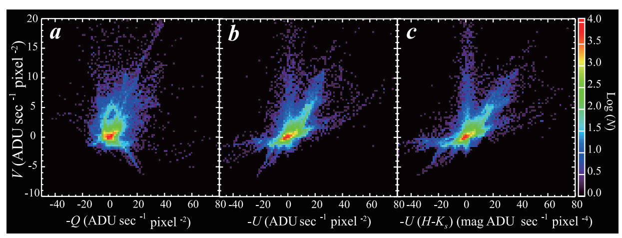

Figure 2: Pixel-by-pixel correlation using logarithmic color: (a) between Stokes *V* and *Q*; (b) between Stokes *V* and *U*; (c) between Stokes *V* and the product of Stokes *U* and *H* –*Ks* color. Stokes *Q* and *U* express linear polarization, and *V* expresses circular polarization.

References

[1] Fukue, T., et al.: 2009, *ApJL*, **692**, 88.
[2] Fukue, T.: 2009, *Polarimetric Study of Star/Planet-Forming Regions*, Ph.D thesis, Kyoto University.
[3] Tamura, M., et al.: 2006, *ApJ*, **649**, 29.

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New nuclear cosmochronometer for supernova neutrino process

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Long-lived radioactivities are celestial nuclear cosmochronometers to date when stellar nucleosynthesis occurred, which have been widely used for estimation of ages of early generations of stars and the Milky way. Since the number of the long-lived radioactivities is limited, there exist only six cosmochronometers, ^{40}K, ^{87}Rb, ^{176}Lu, ^{187}Re, ^{232}Th, and ^{238}U, whose half-lives are of the cosmological time scale 1–100 Gyr. However, there is no chronometer for neutrino reaction nucleosynthesis in supernovae (ν-process).

We have proposed a ^{138}La ($T_{1/2}$=102 Gyr) - ^{138}Ce - ^{136}Ce system as a chronometer to measure the time elapsed from a single ν-process [1]. These three nuclei are classfied to the p-nuclei and ^{138}La is considered to be synthesized dominantly by the ν-process [2]. This chronometer is applied to samples affected by a single nucleosynthesis episode, for example, presolar grains in primitive meteorites. Recent studies of the presolar grains suggest that such samples are available. If the abundances of ^{136,138}Ce and ^{138}La in a sample affected strongly by a single supernova are known, an age T elapsed from the supernova episode is calculated by

$$T = -\frac{T_{1/2}(^{138}\mathrm{La})}{ln2} \times ln\left(\frac{\frac{N(^{138}\mathrm{La})}{N(^{138}\mathrm{Ce})}}{\frac{N(^{138}\mathrm{La})}{N(^{138}\mathrm{Ce})} + \frac{1}{b}\left(1 - R_{pp}(\mathrm{Ce}) \times \frac{N(^{136}\mathrm{Ce})}{N(^{138}\mathrm{Ce})}\right)} \right), \quad (1)$$

where N is the observed abundance in the sample, R_{pp} is the initial $N(^{138}\mathrm{Ce})/N(^{136}\mathrm{Ce})$ ratio at the freezeout and b is the branching ratio of the β^- decay of ^{138}La. The R_{pp}(Ce) ratio can be calculated by an empirical scaling law between two p-nuclei with the same atomic number, which was found in the solar system abundances. The detailed mechanism of the empirical scaling law was presented in our previous paper [3]. The R_{pp}(Ce) ratio is estimated to be 1.2.

In addition, we have pointed out that the nuclear structure of ^{138}La is crucial for the performance of the chronometer and the ν process origin of ^{138}La. The lowest 1^+ state has not been established experimentally. If this 1^+ excited state exists at energy lower than 72 keV that is the energy of the first excited state, the 1^+ state may be a β unstable isomer. If so, ^{138}La synthesized by the ν-process is destroyed via the isomer (see Fig. 1).

Neumann-Cosel et al., commented to us that a recent nuclear experiment on ^{138}La [4] indicates that the existence of a low-energy 1^+ state in ^{138}La is extremely unlikely [5]. This is consistent with our shell model calculation in a relatively large model space [1]. We conclude that there is no evidence that suggests the existence of the 1^+ isomer in ^{138}La and our proposed cosmochronometer is robust from this viewpoint [6].

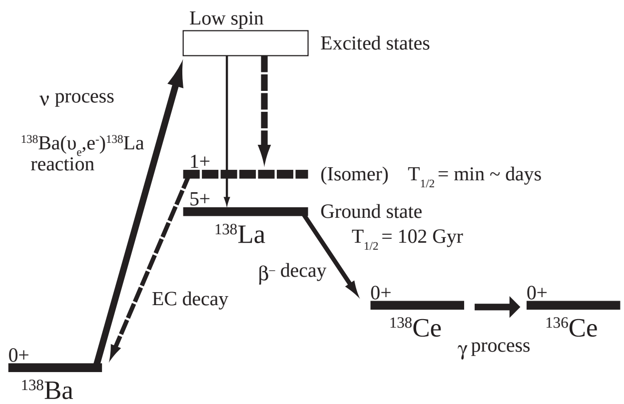

Figure 1: Schematic view of nucleosynthesis of ^{138}La.

References
[1] Hayakawa, T., et al.: 2008, *PRC*, **77**, 065802.
[2] Heger, A., et al.: 2005, *Phys. Lett. B*, **606**, 258.
[3] Hayakawa, T., et al.: 2008, *ApJ*, **685**, 1089.
[4] Byelikov, A., et al.: 2007, *Phys. Rev. Lett.*, **98**, 082501.
[5] Neumann-Cosel, et al.: 2009, *PRC*, **79**, 059801.
[6] Hayakawa, T., et al.: 2009, *PRC*, **79**, 059802.

Necessary conditions for super-integrability of Hamiltonian systems

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A super-integrable system is defined to be a system having maximum number of first integrals among integrable Hamiltonian systems. The Kepler problem is a super-integrable system. In a super-integrable system, all bounded orbits are closed (periodic) like the elliptic orbits in the Kepler problem (Fig. 1).

A particle motion in a centrifugal potential $V = V(r)$ is always integrable. It is known that among them, potentials in which bounded orbits are always periodic are limited to only two cases; the Kepler problem with $V(r) = -1/r$, and the isotropic harmonic oscillator with $V(r) = r^2$. This is known as Bertrand's theorem (1873). Since periodicity of all bounded orbits is a consequence of super-integrability of the system, the classical Bertrand's theorem is considered to have listed up all super-integrable centrifugal potentials. In the present work, a necessary conditions for super-integrability of Hamiltonian systems with homogeneous potential is given, which is based on a theorem of Morales-Ramis (2001) on necessary conditions for integrability.

For a potential system $\ddot{\boldsymbol{q}} = -\nabla V(\boldsymbol{q})$ with a 2-dim. homogeneous potential $V(\boldsymbol{q})$ of degree k, fix a solution $\boldsymbol{q} = \boldsymbol{c}$ of the simultaneous algebraic equation $\nabla V(\boldsymbol{q}) = \boldsymbol{q}$. Then compute the quantity

$$\lambda = \nabla^2 V(\boldsymbol{c}) - (k-1)$$

The Morales-Ramis theorem says that if the system under consideration is integrable, then the λ must be one of the discrete values (two spectrums)

$$\lambda \in \{0, 1, k-1, k+2, 3k-2, \ldots\}$$
$$\lambda \in \left\{\frac{k-1}{2k}, \frac{k-1}{2k} + k, \frac{k-1}{2k} + 3k, \ldots\right\}$$

Furthermore, λ can be arbitrary when $k = \pm 2$, and additional spectrums are permitted when $k = \pm 3, \pm 4, \pm 5$.

Since super-integrable system is integrable, λ must satisfy at least the necessary condition for integrability in order to be super-integrable. Only some subsets of λ values are compatible with super-integrability. Below is the main result [1].

- when $k \geq 3$ or $k \leq -3$:

$$\lambda \in \left\{\frac{k-1}{2k}, \frac{k-1}{2k} + k, \frac{k-1}{2k} + 3k, \ldots\right\}$$

  and additional spectrums when $k = \pm 3, \pm 4, \pm 5$.
- $k = 2 : \lambda = (n/m)^2$, a square of non-zero rationals
- $k = 1 : \lambda = 0$
- $k = -1 : \lambda = 1$
- $k = -2 : \lambda = 1 - (n/m)^2$

Application of this theorem to homogeneous centrifugal potentials $V = \pm r^k$ always gives the value $\lambda = 1$. This value of λ is compatible with super-integrability only when $k = -1$ and $k = 2$. This means that system can be super-integrable only in the case of Kepler problem ($k = -1$) and isotropic harmonic oscillator ($k = 2$). Thus, it turns out that the classical Bertrand's theorem is just a simple example of a wide applicable theorem.

When this new condition is applied to known sequences of integrable homogeneous polynomial potentials of arbitrary degree k, it is shown that the system cannot be super-integrable whenever $k \geq 3$. This suggests that there are no more super-integrable systems besides known ones; harmonic oscillators with rational frequency ratios.

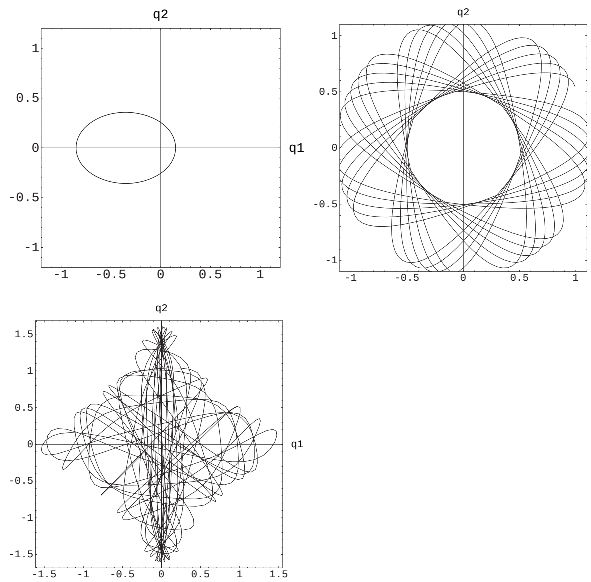

Figure 1: Typical orbits in a super-integrable system (upper-left), in an integrable system (upper-right), and in a nonintegrable system (lower-left).

Reference

[1] Maciejewski, A., Przybylska, M., Yoshida, H.: 2008, *Phys. Lett. A*, **372**, 5581.

Trojan Stars near the Galactic Center

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Young and massive stars have been found within one parsec from the Galactic center (GC) [1]. How these massive stars were brought to the vicinity of the supermassive black hole (SMBH) has been a mystery. One possible scenario is the in-situ formation in an accretion disk. Giant molecular clouds fall into the GC and form massive gaseous disks around the central BH. Stars form in the disk if it becomes gravitationally unstable and results in fragmentation [2]. Another possible scenario is the following. A star cluster formed at a few tens of pc from the GC, and then spiraled in due to the dynamical friction [3].

We performed a fully self-consistent N-body simulation in which the internal dynamics of the cluster, that of the parent galaxy, and interactions between cluster stars and galaxy stars are correctly handled. We used the Bridge code [4] to handle the interaction between the parent galaxy and the star cluster fully self-consistently. The Bridge scheme is a tree-direct hybrid scheme. In our simulation, we adopted collisions of stars in a star cluster and formation of an intermediate-mass black hole (IMBH) in the cluster.

Figure 1 shows the projected distribution of stars at the end of the run. This figure looks very similar to K-band images of the GC [5].

We found that an IMBH is formed in the star cluster and stars escaped from the cluster are captured into a 1:1 mean motion resonance with the IMBH. These "Trojan" stars are brought close to the SMBH by the IMBH, which spirals into the GC due to the dynamical friction. Furthermore, star clusters selectively carry massive stars close to the GC. Massive stars sink to the center of their parent star clusters due to the mass segregation. As a result, massive stars tend to remain in star clusters and are carried to a few parsec from the GC.

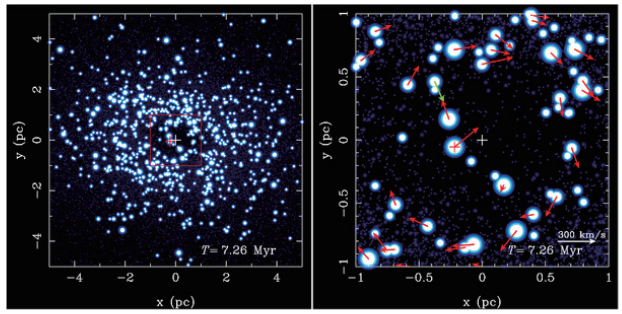

Figure 1: Projected distribution of stars at T = 7.26 Myr.

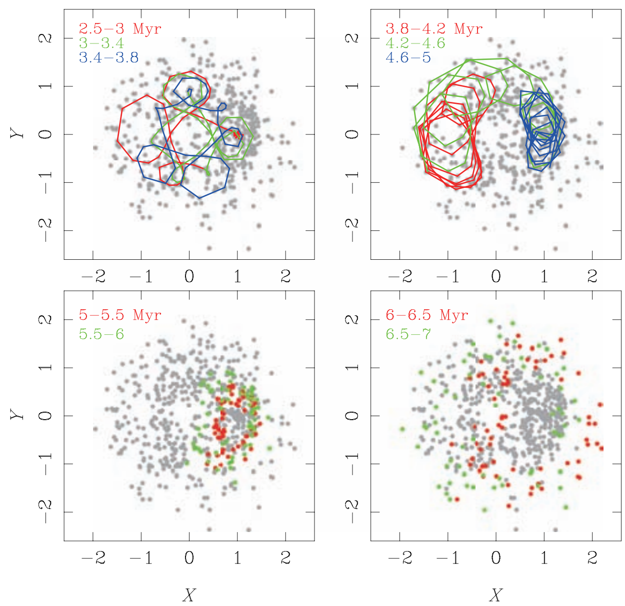

Figure 2: Orbit of a star in a rotational frame, where the IMBH is fixed at (1.0, 0.0).

References

[1] Paumard, T., et al.: 2006, *ApJ*, **643**, 1011.
[2] Levin, Y., Beloborodov, M.: 2003, *ApJ*, **590**, L33.
[3] Gerhard, O.: 2001, *ApJL*, **546**, L39.
[4] Fujii, M., et al.: 2007, *PASJ*, **59**, 1095.
[5] Lu, J. R., et al.: 2006, *J. Phys. Conf. Ser.*, **54**, 279.

Detection of Fluorine in the Halo Planetary Nebula BoBn1: Evidence For a Binary Progenitor Star

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Currently, over 1,000 objects are regarded as planetary nebulae (PNe) in the Galaxy, while 14 of them have been identified as halo members from their location and kinematics. Halo PNe are interesting objects as they provide direct insight into the final evolution of old, low-mass halo stars, and they are able to convey important information for the study of low-mass star evolution and the early chemical conditions of the Galaxy.

Five objects are known as C- and N-rich ([C,N/O] $\gtrsim 0$) halo PNe with [Ar/H] $\lesssim -1.7$. The progenitors of halo PNe are thought to be ~0.8 $M_{\odot}$ stars, which is the typical mass of a halo star. These C- and N-rich halo PNe, however, show signatures that they have evolved from massive progenitors. For example, these halo PNe can become N-rich, but not C-rich, if they have evolved from ~0.8 $M_{\odot}$ single stars, according to the current stellar evolution models. To become C-rich PNe, the third dredgeup (TDU) must take place in the late AGB phase. However, the TDU takes place in stars with initial masses $\gtrsim$ 1.2–1.5 $M_{\odot}$. Also, current stellar evolutionary models predict that the post-AGB evolution of a star with an initial mass ~0.8 $M_{\odot}$ proceeds too slowly for a visible PN to be formed. Resolving these issues would offer important results to build realistic stellar evolution and Galactic chemical evolution models. Chemical abundance analysis should help solve these issues, by revealing the signatures of internal nucleosynthesis and mixing taking place in progenitor stars. In this paper, we report the results of chemical abundance analysis of BoBn1 using VLT/UVES archive spectra [1]. BoBn1 is an extremely metal-poor ([Ar/H] ~ −2.1) and C- and N-rich halo PN ([C/O] ~ +1.5, [N/O] ~ +1.0).

Our analysis reveals that the [C/Fe] and [N/Fe] abundances of BoBn1 are compatible with those of carbonenhanced metal-poor (CEMP) stars (Fig. 1). C and N overabundances of CEMP can be explained by theoretical binary interaction models. We have detected two fluorine (F) lines (Fig. 2). The [F/H] of this object is +1.1 ± 0.1, which makes BoBn1 the most F-enhanced and metal-poor PN among F-detected PNe and provides new evidence that F is enhanced by nucleosynthesis in low mass metal-poor stars (Fig. 2 in [1]). We have found that the C, N, and F overabundances of BoBn1 are comparable to those of the CEMP HE1305+0132 (HE1305, hereafter).

The chemical similarities between BoBn1 and CEMP stars suggest that this PN shares a similar origin and evolutionary history. The theoretical model by [2] demonstrated that HE1305 consists of ~2 $M_{\odot}$ (primary) and ~0.8 $M_{\odot}$ (secondary) stars, and the enhanced C and F can be explained by binary mass transfer from the primary star. The C and F abundances of BoBn 1 can be explained by the ~2 $M_{\odot}$ and ~0.8 $M_{\odot}$ binary model of [2]. Also, the issue of evolutionary time scale can be resolved if BoBn 1 has evolved from a binary and experienced mass transfer in the mid-course of its evolution.

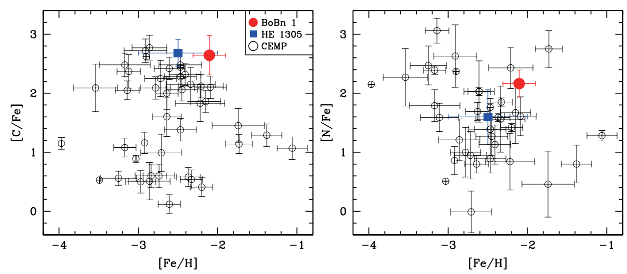

Figure 1: Location of BoBn1 on the diagrams of [C/Fe] (*left*) and [N/Fe] (*right*) vs. [Fe/H]. For BoBn1, we used Ar instead of Fe.

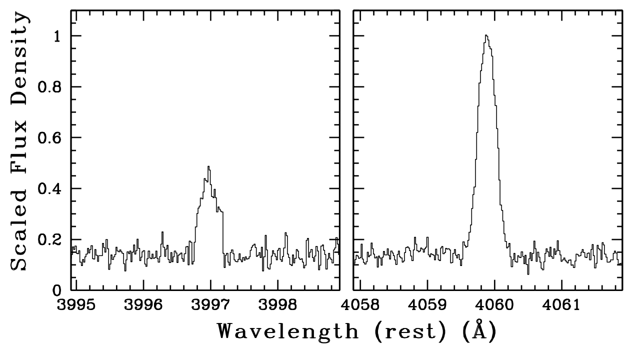

Figure 2: Emission line-profiles of [F IV] λ3996.92 Å (*left*) and [F IV] λ4059.90 Å (*right*) of BoBn 1.

References

[1] Otsuka, M., et al.: 2008, *ApJ*, **682**, L105.
[2] Lugaro, M., et al.: 2008, *A&A*, **484**, L27.

Project Milkyway: Shock-Induced Starburst at a Collision Interface during the First Encounter of Interacting Galaxies

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The goal of “Project Milkyway” is to reveal the formation process of galaxies, especially that of the Milkyway galaxy, by the state-of-the-art simulations. For this purpose, we have developed (i) PC-clusters whose computational nodes consist of ordinary CPUs (AMD Opteron) and special purpose computer, GRAPEs, which accelerates the calculation of gravity, and (ii) a special code for parallel simulations with GRAPEs, ASURA. The latest version of ASURA employs a Phantom-GRAPE library, which is a software emulator of GRAPE tuned with SIMD operations.

We performed high resolution simulations of galaxy-galaxy collisions with ASURA on Cray XT4 at CfCA [1]. In this simulation, we resolved a multiphase nature of the interstellar medium and adopted a realistic conditions for star formation [2]. Previous simulations of galaxy-galaxy merging, on the contrary, did not employ a lower part of a cooling function (< 10^4K) and considered relatively diffuse regions ($n_H > 0.1\,cm^{-3}$) as star forming regions. These simulations could not resolve neither wide spread starbursts nor star cluster formation during the first encounter.

Our simulations successfully resolved not only a wide spread starburst during the first encounter but also the formation of star clusters. The starburst took place along a filamentary region, which was induced by hydrodynamical shocks. This starburst rapidly quenched because of the effect of supernovae. After $3{\times}10^7$ yr later, we found about ten self-bound star clusters along the filament. Interestingly, these star clusters have no dark matter. Our results are consistent with the observational properties of colliding galaxies.

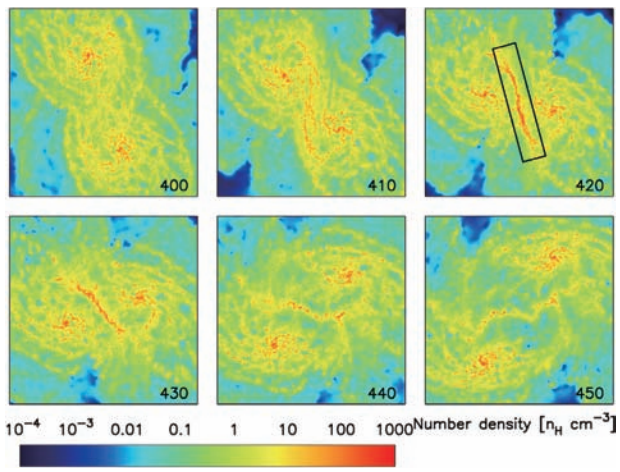

Figure 1: The evolution of gas density during the first encounter. A large and dense filament appears at the collision interface.

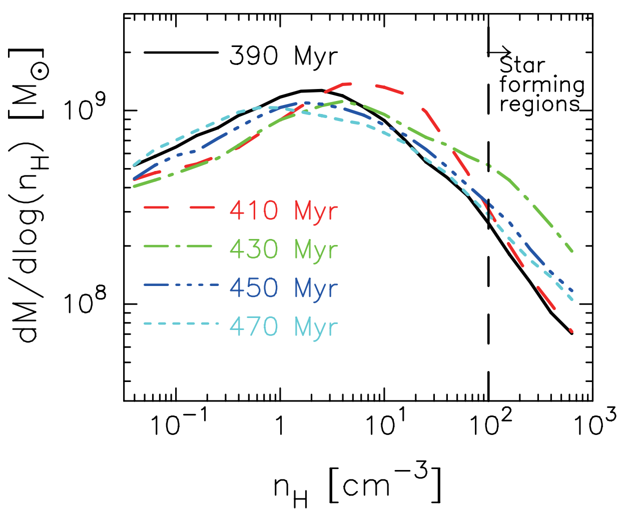

Figure 2: The evolution of gas mass as a function of density during the first encounter. Gas, which was compressed by the large scale shock, satisfies star formation conditions and a burst-like star formation took place.

References

[1] Saitoh, T. R., et al.:2009, *PASJ*, **61**, 481.
[2] Saitoh, T. R., et al.:2008, *PASJ*, **60**, 667.

Limit of primordial magnetic field from the matter power spectra

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Recent observations show that magnetic fields in clusters of galaxies are 0.1–1.0 μG. Many authors also suggest the existence of a primordial magnetic field (PMF) from this fact, and study effects of PMF in the early univeses, such as the cosmic microwave background (CMB) [1, 2, 3], or the matter density field [4, 5]. In this article we introduce effects of PMF on a matter power spectra of density fluctuations in early universe, and show that the observational constraints on cosmological density fluctuations, as parameterized by σ_8, lead to strong constraints on the amplitude and spectral index of the PMF [4, 5].

Pressure and tension of the PMF affect the evolution of density fluctuations of ionized baryons. Since baryon and cold dark matter (CDM) interact with each other thorough gravitational force, the PMF also affects the evolution of density fluctuations of the CDM. Eventually, the total matter density fluctuations are affected by the PMF [4, 5].

The alternative normalization parameter σ_8 is the root-mean-square matter density fluctuation in a comoving sphere of radius $8h^{-1}$ Mpc. It is given by a weighted integral of the matter power spectrum. We can study the physical processes of density field fluctuations on cosmological scales within the linear regime to determine σ_8. From this we can obtain strong constraint on the PMF parameters by numerically calculating σ_8 under the influence of PMF effects.

Since σ_8 is affected by other cosmological parameters, we should consider the degeneracy between the PMF and other cosmological parameters as mentioned above. Fortunately, these cosmological parameters are constrained by recent CMB observations on larger scales ($l < 1000$), while it was shown in our previous work [1] that the effect of the PMF mainly affects the CMB anisotropies on smaller scales ($l > 1000$). Hence, we expect that the degeneracy between the PMF parameters and the other cosmological parameters is small. For this reason in the present analysis we are justified to fix the other cosmological parameters at their best fit values.

We adopt the constraint that PMF parameters giving $\sigma_8 > 1$ are excluded by observations. Figure. 1 shows that a PMF amplitude of $B_\lambda \gtrsim 1$ nG is excluded when $n_B > -0.9$. Furthermore, PMF amplitudes of $B_\lambda \gtrsim 0.1$ nG are excluded when $n_B > 0.2$. The magnetic field strength in galaxy clusters is ~1 μG. Therefore, if isotropic collapse is the only process which amplifies the magnetic field strength, the lower limit to the PMF is ~1 nG at $z \sim 0$. Hence, we can obtain a strong constraint on this PMF evolution model for a PMF spectral index in the range $n_B < -0.9$.

It is very important to constrain the PMF as precisely as possible since a magnetic field affects the formation of large scale structure, for example, magnetic pressure delays the gravitational collapse. Recently, several observations of the CMB anisotropies and polarizations for higher multipoles l, e.g. via the *Planck*, *QUIET*, and *PolarBear*, are progressing as planned. If we combine these future plans and our works, we will be able to limit parameters of the PMF more accurately and develop studies of evolution and formation of large scale structure with the PMF.

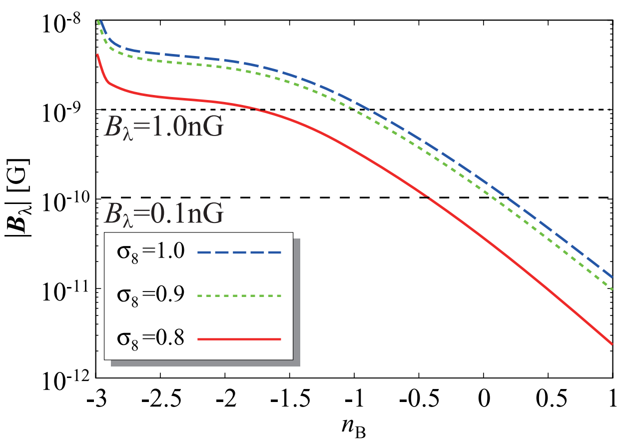

Figure 1: Curves of constant values for σ_8 in the parameter plane of PMF amplitude B_λ vs. spectral index n_B. All curves are as indicated in the legend box in the figure.

References

[1] Yamazaki, D. G., et al.: 2005, *ApJ*. **625**, L1.
[2] Kajino, T., Mathews, G. J.: 2006, *ApJ*, **646**, 719.
[3] Yamazaki, D. G., et al.: 2008, *PRD*, **77**, 043005.
[4] Yamazaki, D. G., et al.: 2006, *PRD*, **74**, 123518.
[5] Yamazaki, D. G., et al.: 2008, *PRD*, **78**, 123001.

Coronal Plasma Motions near Footpoints of Solar Active Region Loops

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The Sun has a tenuous 10^6 K corona located above the photosphere of 6000 K. We try to fully understand how it is heated to such a hot temperature. We are investigating the heating mechanism of the solar activeregion corona from observations with the *Hinode* EUV imaging spectrometer (EIS) [1]. Initial results of this study [2] are presented here.

Figure 1 shows an observation of a solar active region, located at the disk center, with EIS in the Fe XIV emission line at 27.4 nm. The formation temperature of the emission line is about 1.8×10^6 K. In this figure a single Gaussian function is applied for fitting the emission line profile to evaluate the spatial distribution of the line intensity I, Doppler velocity V, and line width W. The enhanced line width is wider than the thermal Doppler width and the enhanced component is called nonthermal velocity V_{NT}. Subsonic upflow motions of $10-20\,\mathrm{km\,s^{-1}}$ and enhanced nonthermal velocities have been found near the footpoints of the active region loops. When the active region is observed near the west limb, both Doppler velocity and nonthermal velocity at the same footpoint region essentially decrease. There is a strong correlation between the upflow velocity and the nonthermal velocity (Fig. 2a). Significant deviations from a single Gaussian profile with a weak emission enhancement are found in the blue wing of the line profiles for the upflows (Fig. 2b and 2c). These suggest that there are unresolved high-speed upflow components. Bluewing enhanced profiles show fast upflow components of heated plasmas whose velocities along the loop strucutre are nearly the coronal sound speed. The *Hinode* EIS has been revealing the characteristic motion of heated coronal plasmas.

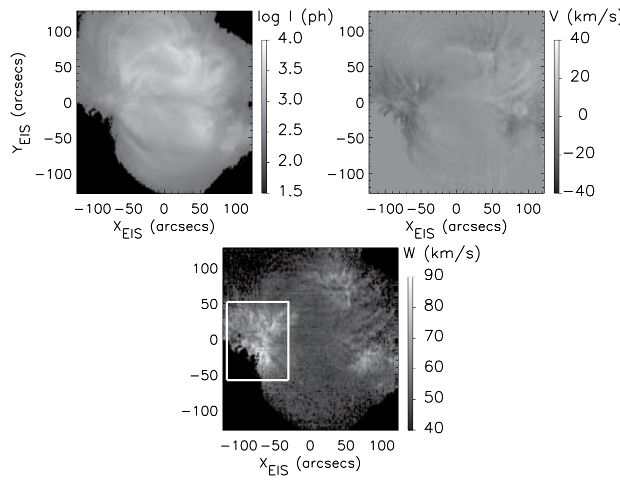

Figure 1: Solar active region located at the disk center of the Sun observed with *Hinode* EUV imaging spectrometer in the emission line Fe XIV at 27.4 nm. Line intensity I, Doppler velocity V, and the line width in full width at half maximum W are shown. Red (blue) shift is indicated in plus (minus) sign for the Dopplergram.

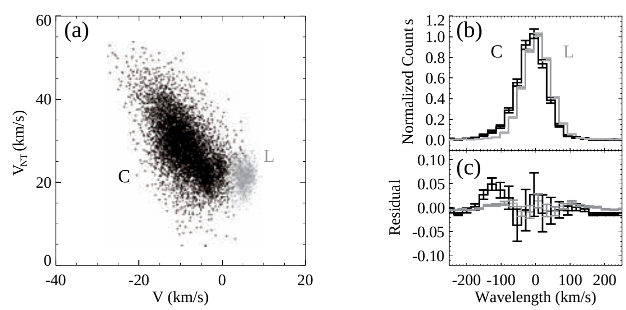

Figure 2: (a) Correlation between Doppler velocity V and nonthermal velocity V_{NT} in Fe XIV at 274 Å. (b) Blue-side enhanced line profiles at a footpoint of a coronal loop and (c) residual from a single Gaussian fit. C (L) in black (gray) shows the line profile in the disk-center (limb) observation.

References

[1] Culhane, J. L., et al.: 2007, *Solar Phys.*, **243**, 19.
[2] Hara, H., et al.: 2008, *ApJ*, **678**, L67.

Subaru Witnesses the Assembly of Distant Clusters 8 Billion Years Ago

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Galaxies are dynamic star systems that have enormous numbers (millions to billions) of stars in wide varieties of colors and shapes. Some galaxies have blue beautifully knotted spiral arms, while others are red diffuse light without arms. As most celestial objects, galaxies are NOT uniformly distributed throughout the Universe. They tend to flock together and form a “cosmic web”, which represents the large-scale structure of the Universe. At intersections within this webwork, astronomers observe massive concentrations of galaxies called Galaxy Clusters.

Astronomers have observed that the colors and shapes of galaxies change depending on their location. In clusters, where so many galaxies live together, galaxies tend to be red and elliptical. On the other hand, galaxies living alone are predisposed to be blue and spiral shaped. Astronomers do not yet have a clear idea why galaxies change their colors and shapes contingent on their location and their surrounding environments. Nonetheless, one way to explain this phenomenon is to observe galaxies at great distances that represent periods long ago in the past. Simply stated, the Universe is like a time machine - as we look deeper into the Universe, we go further back in time. Using the Subaru Telescope, astronomers explored answering the question, “How do galaxies change their colors and shapes over time?”

Recently, an international team of astronomers used Subaru to observe two huge groups of galaxies, galaxy clusters, in the distant Universe. One cluster (RDCS0910) was 8 billion light years away while another (RDCS1252) was 8.5 billion light years distance. These two clusters are among the most distant clusters known to date. Galaxies at such a long distance appear very faint, but Subaru is sensitive enough to collect the dim light from such great distances.

Galaxy shape, color, and distribution in these structures are keys to solving the riddles of galactic evolution in the distant reaches of Universe. Using Suprime-Cam, the astronomers discovered a lot of galaxies within the clusters and found that the clusters are surrounded by small groups of galaxies. Not all these small groups were confirmed to lie at exactly the same distance as the clusters, but this discovery of prominent large-scale structures in the distant Universe is a seed to understanding overall galactic evolution.

Small galaxy groups at this distance (z = 1.2) have previously not been studied in detail, and, as such, are very interesting objects for astronomers. The small galaxy groups may get closer to the nearby larger cluster through gravity and eventually will collide a few hundred million to a few billion years from now. In fact, collisions and mergers are considered primary factors in galactic cluster growth. That is, clusters grow by accreting small galaxy groups around them. It should not be surprising if colors and shapes of galaxies in small groups change during these large-scale collisions.

Looking at the small groups of galaxies in Figures 1, the first thing noted is the fantastic scale. The large zoom-in boxes are 3 million light years across, indicating that the galaxy groups are huge. Looking closely at the boxes, many reddish (well, orange-ish) galaxies are observed. These galaxies are so far away from us that it is impossible to spatially resolve their shapes. However, it is clearly visible that the small groups of galaxies are already dominated by red galaxies at least 8 billion years ago.

The fundamental question for this study was “What do these observations mean?” As mentioned earlier, galaxies living alone tend to have blue colors, while galaxies in clusters have red colors. Galaxies likely change their colors from blue to red during the course of relocation and structural growth. Nearby galaxies pulled together by gravity, form a group of galaxies, and eventually collide with other groups and form large clusters. At some point in this structural growth, blue galaxies become red. The team found in their study that small groups are already dominated by red galaxies before they collide with big clusters. Astronomers have long believed that large clusters are the key environment changing colors and shapes of galaxies, but the findings at Subaru now point astronomers at small groups. Galaxies become red in groups before they get together in large clusters - small groups are the key environment for these changes in shape and color.

Astronomers know several physical processes that can affect colors and shapes of galaxies. Among them, collisions and mergers between galaxies (not between groups) are the ones that work very efficiently. Because groups have many galaxies in them, galaxies can attract each other by gravity and eventually collide and merge. In fact, a computer simulation has shown that a collision between two blue galaxies leaves a single red galaxy. The Universe 8 billion years ago shows us that collisions with other galaxies might be the reason why galaxies change their colors and shapes depending on environment around them. While the astronomers observed just a tiny fraction of the Universe, galaxy collisions alone cannot explain everything and some mysteries remain. Subaru will continue to observe at great distances and at various wavelengths to get a better understanding of galactic transformation.

This work is published in two papers [1] and [2].

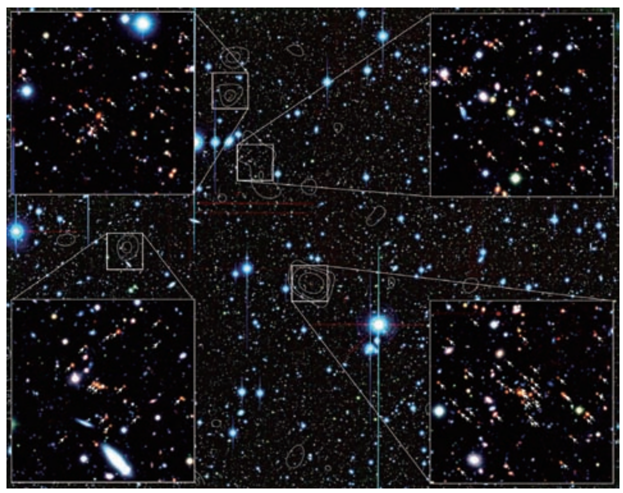

Figure 1: This image shows a cluster of galaxies 8.5 billion light years away in the constellation Hydra. The pseudo-color picture is made with images taken with Suprime-Cam on the Subaru and WFCAM on the United Kingdom Infrared Telescope (UKIRT). The picture covers 35’ x 28’ of the sky. This area corresponds approximately to 60 million x 45 million light years. The contours show how densely galaxies flock together 8.5 billion years ago. The zoom-in views on the corners show small groups and a big cluster of galaxies. The one on the bottom-right is a known large cluster. The newly discovered small groups shown in the other corners surround this massive cluster. Each panel illustrates 3 million light years across. The arrows point at cluster member candidates.

References

[1] Tanaka, M., et al.: 2008, *A&A*, **489**, 571.
[2] Tanaka, M., et al.: 2007, *MNRAS*, **377**, 1206.

Evidence for a Companion to BM Gem, a Silicate Carbon Star

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A small number of carbon stars among those identified in the optical were found to show silicate dust emission features in the IRAS Low Resolution Spectra in 1986 [1, 2]. Silicate dust forms in oxygen-rich environment where the oxygen abundance exceeds the carbon abundance, while it does not in carbon-rich environment where the opposite is the case.

Contemporary stellar evolution theories tell us the occurrence of repetitive runaways of the He shell burning ("thermal pulses") in AGB stars, which are descendants of low- or intermediate-mass stars. In every thermal pulse synthesized carbon is carried to the outer layer, which eventually causes an originally oxygen-rich M-type star evolve into a carbon star.

Two explanations were proposed for the origin of silicate carbon stars. One was that silicate carbon stars were those that had newly evolved from mass-losing, M-type AGB stars so that we could see remnant silicate dust around them in the infrared emission features [2]. The other was that silicate carbon stars were binary systems, each with a mass-losing, M-type AGB star companion that was enshrouded in a thick silicate dust shell that shone in the infrared features [3]. These two propositions were, however, both rejected by follow-up studies.

In more than ten years two new pictures were proposed for the origin of silicate carbon stars. Both postulate a low mass, low luminosity companion and invoke an unknown mechanism that is driven by the binarry interaction and gives rise to either a circum-binary reservoir [4] or a circum-companion disk [5] that retains silicate grains captured when the primary was an M-type mass-losing star. However, there has been no observational evidence for the presence of a companion in silicate carbon stars.

We obtained high resolution, high sensitivity ultra-violet to visible spectra of the brightest silicate carbon star BM Gem with the high dispersion spectrograph HDS on the Subaru telescope. In the spectra we discovered ultraviolet continuum emission that is unusual for carbon stars (Fig. 1). The emission has spectral features typical for an ionized gas. Further, we detected the Balmer series lines, each of which has a P Cygni-type profile that indicates the presence of a high velocity outflow as fast as 400 km s^{-1} and is time variable [6]. No carbon star has been known that shows such spectral features. It is difficult to imagine a new radiative mechanism that produces the observed spectral features in a cool carbon star. On the other hand, we have found that the continuum luminosity is plausibly explained if we interpret the spectral features as emission from an ionized gas that is caused by the heat from the gravitational potential energy release during the accretion of a part of the primary's mass-loss flow by the companion. Furthermore, we have noticed that almost identical spectral features have been observed in Mira B, the companion to the M-type AGB star Mira A (*o* Cet). With these observational results we have conluded the presence of a low-luminosity, low-mass companion to the silicate carbon star BM Gem.

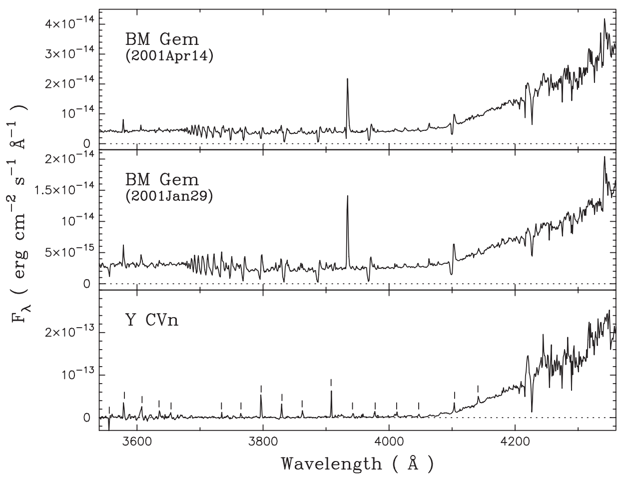

Figure 1: Ultraviolet to visible spectra of BM Gem observed with HDS on Subaru telescope (top and middle, different dates). A spectrum of Y CVn, which looks similar to BM Gem in the visible region, taken with the same setting for comparison (bottom). Small vertical ticks in the bottom show the positions of artifacts that mimic emission lines.

References

[1] Little-Marenin, I. R.: 1986, *ApJL*, **307**, L15.
[2] Willems, F. J., de Jong, T.: 1986, *ApJL*, **309**, L39.
[3] Benson, P. J., Little-Marenin, I. R.: 1987, *ApJL*, **316**, L37.
[4] Jura, M., Kahane, C.: 1999, *ApJ*, **521**, 302.
[5] Yamamura, I., et al.: 2000, *A&A*, **363**, 629.
[6] Izumiura, H., et al.: 2008, *ApJ*, **682**, 499.

Discovery of strange filamentary structures (“fireballs”) around a merger galaxy in the Coma cluster of galaxies

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Clusters of galaxies are ideal experimental laboratories for studying environmental effects on evolution of galaxies. Several environmental effects which explain the evolution of cluster galaxies have been proposed so far and many observational studies have been made to identify the dominant environmental processes in clusters. However, it is still not clear what kinds of physical processes are dominant for rapid galaxy evolution in clusters.

Recently, two peculiar galaxies were found near the central regions of two rich clusters at z ≈ 0.2 [1]. These galaxies have disturbed morphology and are associated with many small blue blobs extending toward the onesides of galaxies. It is suggested that these phenomena may be snapshots of transformation of spiral galaxies to S0 galaxies and may give insights to the origin of faint end population of clusters [1].

Here we report a discovery of a strange complex of narrow blue filaments and knots (Figure 1; its morphology resembles a complex of “fireballs (large meteors)”) which extends up to 80 kpc to the south from a disturbed E+A galaxy, RB199, in the Coma cluster using Subaru Telescope [2]. The morphology of the structure is very similar to that of the phenomena found in the two $z \approx 0.2$ clusters. This structure may be a nearby counterpart of the transition galaxies found in the clusters at $z \approx 0.2$.

The narrow blue filaments extend in straight shapes toward the south from the galaxy and several bright blue knots are located at the south ends of the blue filaments (Figure 1). The R_C band absolute magnitudes, half light radii and estimated masses of the bright knots are $\sim -12 - -13$ mag, ~100 − 200 pc and $\sim 10^{6-7} M_\odot$, respectively. Strong Hα emission is associated with the bright knots. Long narrow Hα emitting filaments are connected at the south edge of the knots. The average color of the “fireballs” is $B - R_C \approx 0.5$, which is bluer than RB199 ($B - R$ = 0.99), suggesting that most of the stars of which the “fireballs” is composed were formed within several times 10^8 yr. There is no Hα emission in the narrow blue filaments, whereas strong Hα and UV emission are emitted at the bright knots. These characteristics indicate that star formation has been recently ceased in the blue filaments and is now in progress in the bright knots. The gas stripped by some mechanism from the disk of RB199 may be traveling in the intergalactic space, forming stars and leaving the formed stars along its trajectories. Most plausible mechanism of forming the “fireballs” is ram pressure stripping by high speed collision between the galaxy and the hot intra-cluster medium. The “fireballs” may be a snapshot of a formation process of diffuse intra-cluster population or halo star population of a cluster galaxy.

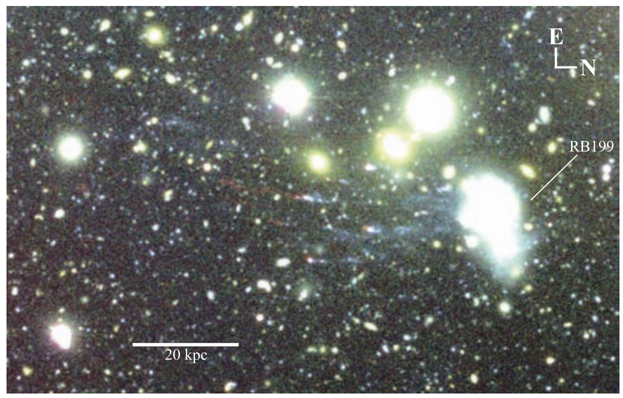

Figure 1: False color (B band: blue, R_C band: green, Hα NB: red) image of area around RB199. North is right and east is top. RB199 is located at the right side of the image. Several blue filaments extend from RB199 to the center of this image and bright blue knots are located at the tips of the filaments. Red Hα emission is associated with the bright knots.

References

[1] Cortese, L., et al.: 2007, *MNRAS*, **376**, 157.
[2] Yoshida, M., et al.: 2008, *ApJ*, **688**, 918.

Lunar Global Topographic Map by the KAGUYA Laser Altimetry

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The main orbiter of Japanese Lunar probe KAGUYA (SELENE) which was launched on 14 September, 2007 (UT; the same hereafter) has successfully closed its observation by the controlled impact onto the Lunar surface on 10 June, 2009. We have constructed a global and precise topographic map of the Moon for the first time using the KAGUYA laser altimeter (LALT) topographic data (Fig. 1) [1]. LALT has obtained about 10 million range data during the nominal observation period from 30 December, 2007 to 27 October, 2008. The along and cross track resolution of the geo-located points in the equatorial region is 1.5 km and less than 10 km, respectively. The mean number density of the geo-located points is about $1/(200\,\mathrm{m})^2$ in both polar regions.

It has been derived that Lunar mean radius is 1737.15 km and the offset between the center of mass (COM) and the center of figure (COF) is 1.93 km by the spherical harmonic analysis of 6.67 million lunar topographic data obtained by 31 March, 2008. The maximum topographic difference is found to be 19.81 km, where height reference is a sphere whose radius is 1737.4 km centered on the COM. The spherical harmonic analysis has also revealed that the amplitude of the topography for the horizontal scale less than 180 km shows 2 or 3 times larger spectrum than the previous estimation. This may suggest that the small scale topography is not compensated and more rigid than other terrestrial planets [1].

In the Lunar polar regions, volatile materials such as water ice are expected to be buried within the regolith in the deep crater floor where the sun lit rate is zero due to the low solar elevation; while the high place where the sun lit rate is high such as on the crater rim is promising candidate site for the Lunar base. We have calculated and mapped the solar illumination condition on the both polar regions for more than 85 degrees based on the LALT data. The results are as follows; (i) the sun lit rate is 89% and 86% at most for the north and south region respectively, (ii) the permanent shadow area for more than 87.5 degrees is 844 km^2 and 2751 km^2 for the Lunar north and south polar region, respectively [2].

References

[1] Araki, H., et al.: 2009, *Science*, **323**, 897.
[2] Noda, H., et al.: 2008, *GRL*, **35**, L2420.

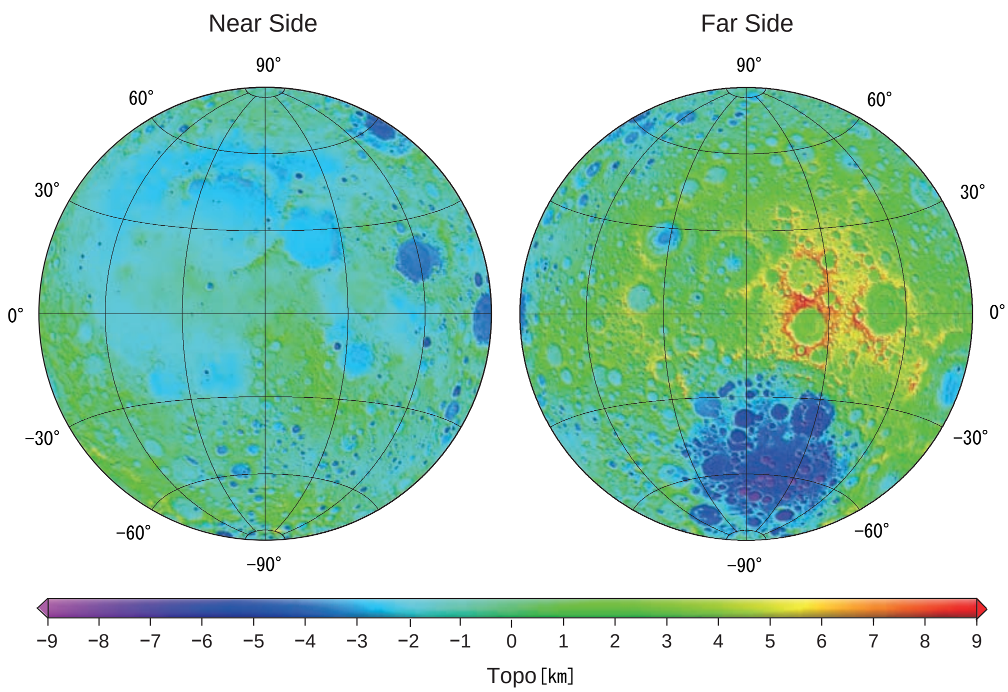

Figure 1: Lunar global topographic map derived from LALT altimetry data from December 30, 2007 to June 30, 2008 shown in Lambert equal area projection. Lunar coordinates are based on the mean Earth/polar axis system. Reference of the height is a sphere whose radius is 1737.4 km and origin is set to the center of mass.

Precise wavefront correction with an unbalanced nulling interferometer for exo-planet imaging coronagraphs

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In 1995, an exoplanet was discovered by a Doppler method for the first time. Since then, about 350 exoplanet were detected almost by indirect methods while a few very bright exoplanets were recently detected by direct coronagraphic imaging in 2009. Spectroscopic analysis of exoplanet light is one of the most important theme in modern astronomy.

The direct imaging and the spectroscopy of Earth-like exoplanets is disturbed by bright diffracted light and speckle noise of a central star, and the required dynamical range is 10^9 ~ 10^{10} on small angular separation of a few λ/D. Here an input wavefront quality of approximately ten thousandths of a wavelength rms is required to reduce the speckle noise. We studied pre-optics with nulling interferometer [1], and complex compensation after interference [2], and, as a combied extension of them, developed a method presented in the following.

We propose a novel method based on a 4-stage configuration of a coronagraph system (Figure 1) [3, 4, 5], in which a very important role is achieved by a middle-stage optics setup (UNI-PAC) that behaves partly as a low-efficiency coronagraph, and partly as a high-sensitivity wavefront aberration compensator (phase and amplitude).

A first adaptive optics (AO) system compensate for the wavefront aberrations of mainly the primary mirror of a telescope with a quality of λ/1000 rms. Second, an (intensity-) unbalanced nulling interferometer (UNI) performs a rejection of part of the wavefront electric field. Then, the input aberrations of the recombined output wavefront are magnified to λ/100 rms. Because of the unbalanced recombination scheme, aberrations can be free of phase singular (zero intensity) points and can therefore be compensated by a downstream phase and amplitude correction (PAC) AO system, using two deformable mirrors with a quality of λ/1000 rms. In the image plane, the central star's peak intensity and the noise level of its speckled halo are reduced by the UNI-PAC combination: the output-corrected wavefront aberrations from the UNI-PAC can be interpreted as an improved compensation of the initial incident wavefront aberrations, implying that the wavefront quality was "virtually" improved to λ/10000 rms beyond the AO system capabilities.

Finally the residual star light is reduced by a coronagraph and the speckle level is kept as low as the planet intensity even with a wavefront quality of λ/1000 rms. A significant advantage of using the UNI-PAC is the relaxation of the specification for the entire optics of the coronagraph system to λ/1000 rms surface error quality, which is an important step towards developing a terrestrial-planet detection system in a cost-effective way.

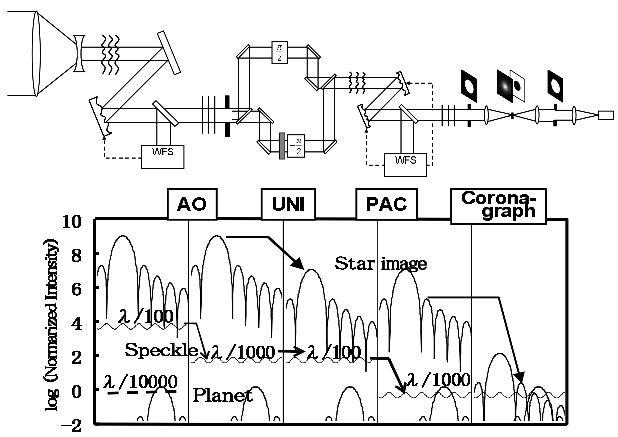

Figure 1: Schematic of the 4-stage coronagraph optics including the UNI-PAC method [3, 4, 5]. Wavefront corrections are made twice at the first AO and the PAC AO system, and star light suppressions are also made twice at the UNI and the coronagraph.

References

[1] Nishikawa, J., et al.: 2005, *A&A*, **435**, 379.
[2] Abe, L., et al.: 2006, *A&A*, **451**, 363.
[3] Nishikawa, J., et al.: 2006, *SPIE*, **6265**, 62653Q.
[4] Nishikawa, J., et al.: 2008, *SPIE*, **7010**, 70102A.
[5] Nishikawa, J., et al.: 2008, *A&A*, **489**, 1389.

TCP-AIC: Tandem common-path achromatic interfero-coronagraph

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New scheme for an achromatic interfero-coronagraph, incorporating two common-path interferometers in tandem (Figure 1), is proposed to attain a deeper nulling for an extended incoherent stellar disk. The predicted performance improvement, by using TCP-AIC has the possibility to reach a 10^{10} achromatic coronagraphic contrast for an almost $10^{-2}\,\lambda/D$ effective source size (stellar disk size).

Direct imaging of extra-solar Earth-like planets, using stellar coronagraphs and nulling interferometers, requires the realization of star-to-planet intensity contrasts, as high as ~10^{10} in the visible wavelength range and ~10^{6} in the mid-IR range. For the detection of a faint planet signal, such optical systems require an extremely accurate wavefront control and a highly stable system configuration. Currently an achromatic π shifter with sufficient inner working angle remains a key device for nulling interferometers and an AIC coronagraph concepts.

The AIC realizes coronagraphic nulling by shifting the geometric phase in a common-path interferometer. This common-path configuration makes the detection system highly immune to environmental disturbances. The coronagraphic image is a centro-symmetrical pair of companion images.

For a monochromatic laser point source of 633 nm, single CPAIC has demonstrated light suppression with a stable coronagraphic contrast of 10^{6} at a $1\,\lambda/D$ off-axis distance [1].

For a star-disk diameter of $10^{-2}\,\lambda/D$ and an off-axis planet separation distance of $1\,\lambda/D$, nulling contrast of only 10^{4} can be achieved with an AIC, which condition corresponds to a Sun-Earth system at 5 pc distance using a 1-meter-class diameter telescope operated at a $1\,\mu$m center wavelength. The resulting non-null residual starlight remains at 2 orders greater than the target planet contrast of 10^{6}, which is required for the mid infrared range. Residual visible light remains 6 orders greater to the 10^{10} contrast required.

To cope with the problem of insufficient spatial coherence caused by an extended source, we proposed the TCP-AIC which use two interferometers cascaded in tandem, effectively making four-beam interference (Figure 2). The TCP-AIC was started experimentally to realize a 10^{10} coronagraphic contrast [2].

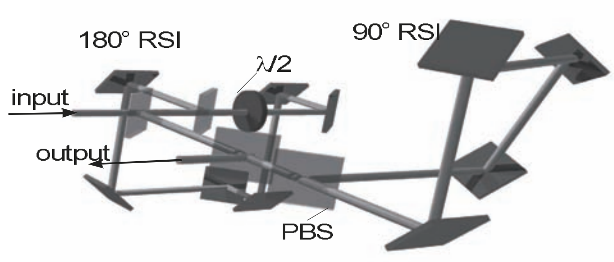

Figure 1: Schematic of the tandem common-path achromatic interferometer coronagraph.

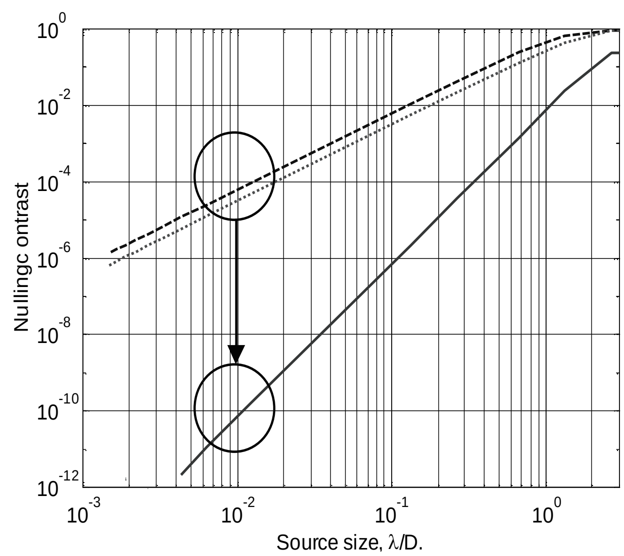

Figure 2: Nulling contrast of the single and tandem CPAIC.

References

[1] Tavrov, A. V., et al.: 2007, *Appl. Opt.*, **46**, 6885.
[2] Tavrov, A. V., et al.: 2008, *Appl. Opt.*, **47**, 4915.

II Publications, Presentations

1. Refereed Publications

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, First joint search for gravitational-wave bursts in LIGO and GEO 600 data, *CQGra*, **25**, 245008.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, Search for Gravitational-Wave Bursts from Soft Gamma Repeaters, *PRL*, **101**, 211102.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, Search of S3 LIGO data for gravitational wave signals from spinning black hole and neutron star binary inspirals, *PhRvD*, **78**, 42002.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, Implications for the Origin of GRB 070201 from LIGO Observations, *AJ*, **681**, 1419.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, Beating the Spin-Down Limit on Gravitational Wave Emission from the Crab Pulsar, *ApJL*, **683**, 45.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, Astrophysically triggered searches for gravitational waves: status and prospects, *CQGra*, **25**, 114051.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2009, All-Sky LIGO Search for Periodic Gravitational Waves in the Early Fifth-Science-Run Data, *PRL*, **102**, 111102.

Abbott, B., et al. including **Kawamura, S.**, **Sakata, S.**: 2009, Einstein@Home search for periodic gravitational waves in LIGO S4 data, *PhRvD*, **79**, 22001.

Akutsu, T., et al. including **Kawamura, S.**, **Arai, K.**, **Tatsumi, D.**, **Fukushima, M.**, **Yamazaki, T.**, **Fujimoto, M.-K.**: 2008, Development of a detector pair for very high frequency gravitational waves, *JPhCS*, **122**, 12007.

Agatsuma, K., et al. including **Takahashi, R.**, **Arai, K.**, **Tatsumi, D.**, **Fukushima, M.**, **Yamazaki, T.**, **Fujimoto, M.-K.**: 2008, Control system for the seismic attenuation system (SAS) in TAMA300, *JPhCS*, **122**, 12013.

Akutsu, T., et al. including **Kawamura, S.**, **Arai, K.**, **Yamamoto, K.**, **Tatsumi, D.**, **Sugiyama, N.**, **Fukushima, M.**, **Yamazaki, T.**, **Fujimoto, M.-K.**: 2008, Search for a Stochastic Background of 100-MHz Gravitational Waves with Laser Interferometers, *PhRvL*, **101**, 101101.

Akutsu, T., et al. including **Tatsumi, D.**: 2008, Search for continuous gravitational waves from PSR J0835-4510 using CLIO data, *CQGra*, **25**, 184013.

Allende Prieto, C., et al. including **Aoki, W.**: 2008, The Segue Stellar Parameter Pipeline. III. Comparison with High-Resolution Spectroscopy of Sdss/segue Field Stars, *AJ*, **136**, 2070-2082.

Amano, S., Horikawa, K., Ishihara, K., Miyamoto, S., **Hayakawa T.**, Shizuma, T., Mochizuki, T.: 2009, Several-MeV Gamma-ray generation at NewSUBARU by laser Compton backscattering, Nucl. Instrum. Method, *Phys. Res. A*, **602**, 337-341.

Ando, M., et al. including **Kawamura, S.**, **Seto, N.**, **Arai, K.**, **Fujimoto, M.-K.**, **Fukushima, M.**, **Ishizaki, H.**, **Kotake, K.**, **Ohishi, N.**, **Sakata, S.**, **Takahashi, R.**, **Yamazaki, T.**: 2008, DECIGO pathfinder, *JPhCS*, **120**, 32005.

Antolin, P., Shibata, K., **Kudoh, T.**, Shiota, D., Brooks, D.: 2008, Predicting Observational Signatures of Coronal Heating by Alfvén Waves and Nanoflares, *ApJ*, **688**, 669-682.

Aoki, W., Beers, T. C., Sivarani, T., Marsteller, B., Lee, Y. S., Honda, S., Norris, J. E., Ryan, S. G., Carollo, D.: 2008, Carbon-Enhanced Metal-Poor Stars. III. Main-Sequence Turnoff Stars from the SDSS SEGUE Sample, *ApJ*, **678**, 1351-1371.

Aoki, W., Honda, S.: 2008, Enrichment of Lead (Pb) in the Galactic Halo, *PASJ*, **60**, L7-L11.

Arai, K., on behalf of the TAMA collaboration: 2008, Recent progress of TAMA300, *JPhCS*, **120**, 32010.

Araki, H., **Tazawa, S.**, **Noda, H.**, Ishihara, Y., **Goossens, S.**, **Sasaki, S.**, **Kawano, N.**, Kamiya, I., Otake, H., Oberst, J., Shum, C. K.: 2009, Lunar Global Shape and Polar Topography Derived from Kaguya-LALT Laser Altimetry, *Science*, **323**, 897-900.

Araki, H., **Tazawa, S.**, **Noda, H.**, Tsubokawa, T., **Kawano, N.**, **Sasaki, S.**: 2008, Observation of the lunar topography by the laser altimeter LALT on board Japanese lunar explorer SELENE, *AdSpR*, **42**, 317-322.

Arase, Y., **Takahashi, R.**, **Arai, K.**, **Tatsumi, D.**, **Fukushima, M.**, **Yamazaki, T.**, **Fujimoto, M.-K.**, Agatsuma, K., Nakagawa, N.: 2008, Damping system for torsion modes of mirror isolation filters in TAMA300, *JPhCS*, **122**, 12027.

Arentoft, A., et al. including **Kambe, E.**, **Ando, H.**, **Izumiura, H.**: 2008, A Multisite Campaign to Measure Solar-like Oscillations in Procyon. I. Observations, Data Reduction, and Slow Variations, *ApJ*, **687**, 1180-1190.

Asada, K., **Inoue, M.**, Nakamura, M., Kameno, S., **Nagai, H.**: 2008, Multifrequency Polarimetry of the NRAO 140 Jet: Possible Detection of a Helical Magnetic Field and Constraints on Its Pitch Angle, *ApJ*, **682**, 798.

Asai, A., **Hara, H.**, **Watanabe, T.**, **Imada, S.**, Sakao, T., Narukage, N., Culhane, J. L., Doschek, G. A.: 2008, Strongly Blueshifted Phenomena Observed with Hinode EIS in the 2006 December 13 Solar Flare, *ApJ*, **685**, 622-628.

Asai, A., Shibata, K., Ishii, T. T., Oka, M., Kataoka, R., Fujiki, K., Gopalswamy, N.: 2009, Evolution of the anemone AR NOAA 10798 and the related geo-effective flares and CMEs, *JGR*, **114**, A00A21.

Aso, Y., et al. including **Kotake, K.**: 2008, Search method for coincident events from LIGO and IceCube detectors, *CQGra*, **25**, 114039.

Aspin, C., et al. including **Pyo, T.-S.**: 2009, Near-Ir Spectroscopy of Young Stars in the Braid Nebula Star Formation Region in Cygnus OB7, *AJ*, **137**, 431-449.

Baek, C. H., **Kudoh, T.**, **Tomisaka, K.**: 2008, How was the Mushroom-shaped GW 123.4-1.5 Formed in the Galactic Disk?, *ApJ*, **682**, 434-444.

Baggio, L., et al. including **Kawamura, S.**, **Sakata, S.**: 2008, A joint search for gravitational wave bursts with AURIGA and LIGO, *CQGra*, **25**, 95004.

Bailey, J., Ulanowski, Z., Lucas, P. W., Hough, J. H., Hirst, E., **Tamura, M.**: 2008, The effect of airborne dust on astronomical polarization measurements, *MNRAS*, **386**, 1016-1022.

Barbary, K., et al. including **Morokuma, T.**: 2009, Discovery of an Unusual Optical Transient with the Hubble Space Telescope, *ApJ*, **690**, 1358-1362.

Bekki, K., **Tsujimoto, T.**, Chiba, M.: 2009, Role of Galactic Gaseous Halos in Recycling Enriched Winds from Bulges to Disks: A New Bulge-Disk Chemical Connection, *ApJ*, **692**, L24-L28.

Bekki, K., Yahagi, H., **Nagashima, M.**, Forbes, D. A.: 2008, The origin of globular cluster systems from cosmological simulations, *MNRAS*, **387**, 1131.

Bernard, J. P., et al. including **Mizuno, N.**: 2008, Spitzer Survey of the Large Magellanic Cloud, Surveying the Agents of a Galaxy's Evolution (sage). IV. Dust Properties in the Interstellar Medium, *AJ*, **136**, 919-945.

Blanc, M., et al. including **Sasaki, S.**: 2009, LAPLACE: A mission to Europa and the Jupiter System for ESA's Cosmic Vision Programme, *ExA*, **23**, 849-892.

Blustin, A. J., Dwelly, T., Page, M. J., McHardy, I. M., Seymour, N., Kennea, J. A., Loaring, N. S., Mason, K. O., **Sekiguchi, K.**: 2008, Properties of X-ray-selected broad absorption-line quasars, *MNRAS*, **390**, 1229-1240.

Bowler, B. P., Waller, W. H., Megeath, S. T., Patten, B. M., **Tamura, M.**: 2009, An Infrared Census of Star Formation in the Horsehead Nebula, *AJ*, **137**, 3685-3699.

Brown, C. M., Feldman, U., Seely, J. F., Korendyke, C. M., **Hara, H.**: 2008, Wavelengths and Intensities of Spectral Lines in the 171–211 and 245–291 A Ranges from Five Solar Regions Recorded by the Extreme-Ultraviolet Imaging Spectrometer (EIS) on *Hinode*, *ApJS*, **176**, 511.

Brown, T. M., et al. including **Iye, M.**, **Komiyama, Y.**, **Tanaka, M.**: 2008, The Extended Star Formation History of the Andromeda Spheroid at 35 kpc on the Minor Axis, *ApJ*, **685**, 121-124.

Buat, V., Boissier, S., Burgarella, D., Takeuchi, T. T., Le Floc'h, E., Marcillac, D., Huang, J., **Nagashima, M.**, Enoki, M.: 2008, Star formation history of galaxies from z = 0 to z = 0.7. A backward approach to the evolution of star-forming galaxies, *A&A*, 483, 107.

Burningham, B., et al. including **Tamura, M.**, **Ishii, M.**, **Kuzuhara, M.**: 2008, Exploring the substellar temperature regime down to ~550K, *MNRAS*, **391**, 320-333.

Carter, D., et al. including **Komiyama, Y.**: 2008, The Hubble Space Telescope Advanced Camera for Surveys Coma Cluster Survey. I. Survey Objectives and Design, *ApJS*, **176**, 424-437.

Chae, J., Litvinenko, Yu. E., **Sakurai, T.**: 2008, Determination of Magnetic Diffusivity from High-Resolution Solar Magnetograms, *ApJ*, **683**, 1153-1159.

Chae, J. C., **Sakurai, T.**: 2008, A Test of Three Optical Flow Techniques-LCT, DAVE, and NAVE, *ApJ*, **689**, 593-612.

Chae, J. C., Ahn, K. S., Lim, Y. K., Choe, G. S., **Sakurai, T.**: 2008, Persistent Horizontal Flows and Magnetic Support of Vertical Threads in a Quiescent Prominence, *ApJ*, **689**, L73-L76.

Chaplin, W. J., et al. including **Sekii, T.**: 2008, AsteroFLAG – from the Sun to the stars, *JPhCS*, **118**, 12048.

Chiba, S., Koura, H., **Hayakawa, T.**, Maruyama, T., Kawano, T., **Kajino, T.**: 2008, Direct and semi-direct capture in low energy (n,γ) reactions of neutron-rich Tin isotopes and its implications for the r-process nucleosynthesis, *PhRvC*, **77**, 15809.

Chifor, C., Isobe, H., Mason, H. E., Hannah, I. G., Young, P. R., Del Zanna, G., Krucker, S., Ichimoto, K., **Katsukawa, Y.**, Yokoyama, T.: 2008, Magnetic flux cancellation associated with a recurring solar jet observed with Hinode, RHESSI, and STEREO/EUVI, *A&A*, **491**, 279.

Chifor, C., Young, P. R., Isobe, H., Mason, H. E., Tripathi, D., **Hara, H.**, Yokoyama, T.: 2008, An active region jet observed with Hinode, *A&A*, **481**, L57.

Choi, M., Hamaguchi, K., Lee, J.-E., **Tatematsu, K.**: 2008, Centimeter Imaging of the R Coronae Australis Region, *ApJ*, **687**, 406-424.

Choi, M., **Tatematsu, K.**, Hamaguchi, K., Lee, J.-E.: 2009, Centimeter Polarimetry of the R Coronae Australis Region, *ApJ*, **690**, 1901-1908.

Choi, Y. K., et al. including **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kijima, M.**, **Kim, M. K.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**, **Sato, K.**, **Sato, M.**, **Shibata, K. M.**, **Tamura, Y.**: 2008, Distance to VY Canis Majoris with VERA, *PASJ*, **60**, 1007-1012.

Clements, D. L., et al. including **Furusawa, H.**, **Sekiguchi, K.**: 2008, The SCUBA Half-Degree Extragalactic Survey (SHADES) – VIII. The nature of faint submillimetre galaxies in SHADES, SWIRE and SXDF surveys, *MNRAS*, **387**, 247-267.

Cockell, C. S., et al. including **Tamura, M.**: 2009, Darwin-A Mission to Detect and Search for Life on Extrasolar Planets, *Astrobiology*, **9**, 1-22.

Curdt, W., Wilhelm, K., Feng, L., **Kamio, S.**: 2008, Multi-spacecraft observations of polar coronal plumes , *A&A*, **481**, L61.

Danilovic, S., Gandorfer, A., **Lagg, A.**, Schüssler, M., Solanki, S. K., Vögler, A., **Katsukawa, Y.**, **Tsuneta, S.**: 2008, The intensity contrast of solar granulation: comparing Hinode SP results with MHD simulations, *A&A*, **484**, L17.

Dawson, J. R., Kawamura, A., **Mizuno, N.**, Onishi, T., Fukui, Y.: 2008, Catalogue of ^{12}CO(J = 1–0) and ^{13}CO(J = 1–0) Molecular Clouds in the Carina Flare Supershell, *PASJ*, **60**, 1297-1315.

Dawson, J. R., **Mizuno, N.**, Onishi, T., McClure-Griffiths, N. M., Fukui, Y.: 2008, The 'Carina Flare' supershell: probing the atomic and molecular ISM in a Galactic chimney, *MNRAS*, **387**, 31-44.

de Wijn, A. G., Lites, B. W., Berger, T. E., Frank, Z. A., Tarbell, T. D., **Ishikawa, R.**: 2008, Hinode Observations of Magnetic Elements in Internetwork Areas, *ApJ*, **684**, 1469.

de Wit, W. J., et al. including **Fujiyoshi, T.**, **Yamashita, T.**: 2009, Resolved 24.5 micron emission from massive young stellar objects, *A&A*, **494**, 157-178.

de Wit, W. J., et al. including **Fujiyoshi, T.**, **Yamashita, T.**: 2008, A Red Supergiant Nebula at 25 μm: Arcsecond-Scale Mass-Loss Asymmetries of μ Cephei, *ApJ*, **685**, L75-L78.

Deguchi, S., **Koike, K.**: 2008, Clustering of Mater-Wave Luminous Objects toward Monoceros, *PASJ*, **60**, L31-L36.

Del Moro, A., Watson, M. G., Mateos, S., Akiyama, M., Hashimoto, Y., **Tamura, N.**, Ohta, K., Carrera, F. J., Stewart, G.: 2009, An extreme EXO: a type 2 QSO at z = 1.87, *A&A*, **493**, 445-451.

Doschek, G. A., Warren, H. P., Mariska, J. T., Muglach, K., Culhane, J. L., **Hara, H.**, **Watanabe, T.**: 2008, Flows and Nonthermal

Velocities in Solar Active Regions Observed with the EUV Imaging Spectrometer on Hinode: A Tracer of Active Region Sources of Heliospheric Magnetic Fields?, *ApJ*, **686**, 1362.

Dudley, C. C., **Imanishi, M.**, Maloney, P. R.: 2008, Ice Emission and the Redshifts of Submillimeter Sources, *ApJ*, **686**, 251-261.

Dye, S., et al. including **Takata, T.**: 2008, The SCUBA HAlf Degree Extragalactic Survey (SHADES) – VII. Optical/IR photometry and stellar masses of submillimetre galaxies, *MNRAS*, **386**, 1107-1130.

Ebisuzaki, T., et al. including **Mizumoto, Y.**, **Watanabe, J.**: 2008, The JEM-EUSO Project: Observing Extremely High Energy Cosmic Rays and Neutrinos from the International Space Station, *NuPhS*, **175**, 237-240.

Enomoto, R., et al. including **Mizumoto, Y.**: 2008, CANGAROO-III Search for Gamma Rays from Kepler's Supernova Remnant, *ApJ*, **683**, 383-388.

Famiano, M., Boyd, R., **Kajino T.**, Otsuki, K., Terasawa, M., Mathews, G. J.: 2008, Effects of β-decays of excited-state nuclei on the astrophysical *r*-process, *JPhG*, **35**, 025203.

Frebel, A., Collet, R., Eriksson, K., Christlieb, N., **Aoki, W.**: 2008, HE 1327-2326, an Unevolved Star with [Fe/H]<-5.0. II. New 3D-1D Corrected Abundances from a Very Large Telescope UVES Spectrum, *ApJ*, **684**, 588-602.

Fujii, M., **Iwasawa, M.**, Funato, Y., **Makino, J.**: 2008, Evolution of Star Clusters near the Galactic Center: Fully Self-consistent *N*-body Simulations, *ApJ*, **686**, 1082-1093.

Fujiwara, M., Nagata, H., **Matsuo, H.**, Sasaki, M.: 2008, Optical reduction of low frequency noise in cryogenic GaAs junction field effect transistor, *ApPhL*, **93**, 043503.

Fujiwara, M., Sasaki, M., Nagata, H., **Matsuo, H.**: 2008, Optical control of low frequency noise behavior in cryogenic GaAs junction field effect transistor, Cryogenics, online, doi:10.1016/j.cryogenics.2008.12.011.

Fukue, T., et al. including **Tamura, M.**, **Kandori, R.**, **Kusakabe, N.**, **Nakajima, Y.**, **Hashimoto, J.**: 2009, Near-Infrared Circular Polarimetry and Correlation Diagrams in the Orion Becklin-Neugebauer/Kleinman-Low Region: Contribution of Dichroic Extinction, *ApJ*, **692**, L88-L91.

Fukui, Y., et al. including **Mizuno, N.**, **Ogawa, H.**: 2008, The Second Survey of the Molecular Clouds in the Large Magellanic Cloud by NANTEN. I. Catalog of Molecular Clouds, *ApJS*, **178**, 56-70.

Fukushima, T.: 2008, An Orbital Element Formulation without Solving Kepler's Equation, *AJ*, **135**, 72-82.

Fukushima, T.: 2008, Simple, Regular, and Efficient Numerical Integration of Rotational Motion, *AJ*, **135**, 2298-2322.

Fukushima, T.: 2008, Gaussian Element Formulation of Short-Axis-Mode Rotation of a Rigid Body, *AJ*, **136**, 649-653.

Fukushima, T.: 2008, Canonical and Universal Elements of Rotational Motion of Triaxial Rigid Body , *AJ*, **136**, 1728-1735.

Furusawa, H., et al. including **Kosugi, G.**, **Takata, T.**, **Sekiguchi, K.**, **Tanaka, I.**, **Iwata, I.**, **Kajisawa, M.**, **Furusawa, J.**, **Morokuma, T.**, **Aoki, K.**, **Fuse, T.**, **Imanishi, M.**, **Iye, M.**, **Karoji, H.**, **Kodama, T.**, **Komiyama, Y.**, **Miyazaki, S.**, **Mizumoto, Y.**, **Nakata, F.**, **Noumaru, J.**, **Ogasawara, R.**, **Sasaki, T.**, **Yoshida, M.**: 2008, The Subaru/XMM-Newton Deep Survey (SXDS). II. Optical Imaging and Photometric Catalogs, *ApJS*, **176**, 1-18.

Furuya, R. S., Kitamura, Y., Shinnaga, H.: 2008, Low-Mass Star-Forming Cores in the GF9 Filament, *PASJ*, **60**, 421-428.

Furuya, R. S., Kitamura, Y., Shinnaga, H.: 2009, Spectroscopic Evidence for Gas Infall in GF 9-2, *ApJ*, **692**, L96-L99.

Gaskell, R. W., et al. including **Ishiguro, M.**: 2008, Characterizing and Navigating Small Bodies with Imaging Data, *M&PS*, **43**, 1049-1061.

Goto, M., Henning, Th., Kouchi, A., **Takami, H.**, **Hayano, Y.**, **Usuda, T.**, **Takato, N.**, **Terada, H.**, **Oya, S.**, Jäger, C., Andersen, A. C.: 2009, Spatially Resolved 3 μm Spectroscopy of Elias 1: Origin of Diamonds in Protoplanetary Disks, *ApJ*, **693**, 610-616.

Goto, M., **Usuda, T.**, Nagata, T., Geballe, T. R., McCall, B. J., Indriolo, N., **Suto, H.**, Henning, T., Morong, C. P., Oka, T.: 2008, Absorption Line Survey of H^{+3} toward the Galactic Center Sources. II. Eight Infrared Sources within 30 pc of the Galactic Center, *ApJ*, **688**, 306-319.

Goto, T., Kawai, A., Shimono, A., Sugai, H., **Yagi, M.**, **Hattori, T.**: 2008, Integrated field spectroscopy of E+A (post-starburst) galaxies with the Kyoto tridimensional spectrograph II, *MNRAS*, **386**, 1355-1365.

Goto, T., **Yagi, M.**, Yamauchi, C.: 2008, Spatialy-Resolved Medium Resolution Spectroscopy of E+A (post-starburst) System with the Subaru telescope, *MNRAS*, **391**, 700.

Grechnev, V. V., Uralov, A. M., Slemzin, V. A., Chertok, I. M., Kuzmenko, I. V., **Shibasaki, K.**: 2008, Absorption Phenomena and a Probable Blast Wave in the 13 July 2004 Eruptive Event, *SoPh*, **253**, 263-290.

Greiner, J., et al. including **Aoki, K.**, **Pyo, T.-S.**, **Terada, H.**: 2009, GRB 080913 at Redshift 6.7, *ApJ*, **693**, 1610-1620.

Groen, D., Portegies Zwart, S., McMillan, S., **Makino, J.**: 2008, Distributed *N*-body simulation on the grid using dedicated hardware, *NewA*, **13**, 348-358.

Gusev, A., **Petrova, N.**: 2008, Spin-orbit evolution, geophysics and Selenodesy of the Moon, *AdSpR*, **42**, 289-293.

Guyon, O., Matsuo, T., Angel, R. J.: 2008, Coronagraphic Low Order Wavefront Sensor: Principle and Application to a Phase-Induced Amplitude Coronagraph, *ApJ*, **693**, 75-84.

Guyon, O., Blain, C., **Takami, H.**, **Hayano, Y.**, **Hattori, M.**, **Watanabe, M.**: 2008, Improving the Sensitivity of Astronomical Curvature Wavefront Sensor Using Dual-Stroke Curvature, *PASP*, **120**, 655-664.

Hachisuka, K., Brunthaler, A., Menten, K. M., Reid, M. J., **Hagiwara, Y.**, Mochizuki, N.: 2009, The Distance to a Star-Forming Region in the Outer Arm of the Galaxy, *ApJ*, **696**, 1981.

Hajima, R., **Hayakawa, T.**, Kikuzawa, N., Minehara, E.: 2008, Proposal of Nondestructive Assay Using a High-Flux Gamma-Ray Source and Nuclear Resonance Fluorescence, *J. Nucl. Sci. Tech.*, **45**, 441-451.

Hamaguchi, K., Choi, M., Corcoran, M. F., Choi, C.-S., **Tatematsu, K.**, Petre, R.: 2008, Resolving a Class I Protostar Binary System with Chandra, *ApJ*, **687**, 425-432.

Hamana, T., **Miyazaki, S.**: 2008, Note on Artificial Deformation in Object Shapes Due to Pixelization, *PASJ*, **60**, 1363-1370.

Hanada, H., et al. including **Kawano, N.**, **Asari, K.**, **Ishikawa, T.**, **Kikuchi, F.**, **Liu, Q.**, **Matsumoto, K.**, **Noda, H.**, **Tsuruta, S.**,

Goossens, S.: 2008, VLBI for better gravimetry in SELENE, *AdSpR*, **42**, 341-346.

Hanaoka, Y.: 2009, Spectropolarimetry with the Hida Domeless Solar Telescope, *PASJ*, **61**, 357-365.

Hara, H., **Watanabe, T.**, Harra, L. K., Culhane, J. L., Young, P. R., Mariska, J. T., Doschek, G. A.: 2008, Coronal Plasma Motions near Footpoints of Active Region Loops Revealed from Spectroscopic Observations with Hinode EIS, *ApJL*, **678**, L67.

Hara, H., **Watanabe, T.**, Matsuzaki, K., Harra, L. K., Culhane, J. L., Cargill, P., Mariska, J. T., Doschek, G. A.: 2008, 2006 December 17 Long Duration Flare Observed with the *Hinode* EUV Imaging Spectrometer, *PASJ*, **60**, 275.

Harra, L., Williams, D., Wallace, A., **Magara, T.**, **Hara, H.**, **Tsuneta, S.**, Sterling, A., Doschek, G.: 2009, Coronal Nonthermal Velocity Following Helicity Injection Before an X-Class Flare, *ApJL*, **691**, L99.

Hasegawa, S., Müller, T. G., Kawakami, K., **Kasuga, T.**, Wada, T., **Ita, Y.**, **Takato, N.**, **Terada, H.**, **Fujiyoshi, T.**, Abe, M.: 2008, Albedo, Size, and Surface Characteristics of Hayabusa-2 Sample-Return Target 162173 1999 JU3 from AKARI and Subaru Observations, *PASJ*, **60**, S399-S405.

Hashimoto, J., **Tamura, M.**, **Kandori, R.**, **Kusakabe, N.**, **Nakajima, Y.**, Kurita, M., Nagata, T., Nagayama, T., Hough, J., Chrysostomou, A.: 2008, Wide-Field Infrared Imaging Polarimetry of the NGC 6334 Region: A Nest of Infrared Reflection Nebulae, *ApJ*, **677**, L39-L42.

Hashimoto, T., et al. including **Kajino T.**: 2009, A new mea-surement of the astrophysical ^{8}Li(d,t)^{7}Li reaction, *PhLB*, **674**, 276-280.

Hayakawa, T., Iwamoto, N., **Kajino, T.**, Shizuma, T., Umeda, H., Nomoto, K.: 2008, Empirical Abundance Scaling Laws and Implications for the Gamma Process in Core-Collapse Supernovae, *ApJ*, **685**, 1089-1102.

Hayakawa, T., Shizuma, T., **Kajino, T.**, Ogawa, K., Nakada, H.: 2008, ^{138}La-^{138}Ce-^{136}Ce nuclear cosmochronometer of supernova neutrino process, *PhRvC*, **77**, 65802.

Hayakawa, T., Shizuma, T., **Kajino, T.**, Ogawa, K., Nakada, H.: 2009, Reply to "Comment on ^{138}La-^{138}Ce-^{136}Ce nuclear cosmochronometer of supernova neutrino process", *PhRvC*, **79**, 59802.

Hayakawa, T., et al. including **Kajino, T.**: 2008, Half-life of ^{164}Ho isomer populated by (g,n) reaction from Laser Compton scattering g-rays at NewSUBARU, *PhRvC*, **77**, 68801.

Hayama, K., Desai, S., **Kotake, K.**, Mohanty, S. D., Rakhmanov, M., Summerscales, T., Yoshida, S.: 2008, Determination of the angular momentum distribution of supernovae from gravitational wave observations, *CQGra*, **25**, 184022.

Hayashi, M., **Pyo, T.-S.**: 2009, Wide-Field Near-Infrared Imaging of the L1551 Dark Cloud, *ApJ*, **694**, 582-592.

Hayashi, M., Motohara, K., Shimasaku, K., Onodera, M., Uchimoto, Y. K., **Kashikawa, N.**, **Yoshida, M.**, Okamura, S., Ly, C., Malkan, M. A.: 2009, Star Formation Rates and Metallicities of K-Selected Star-Forming Galaxies at z ~ 2, *ApJ*, **691**, 140-151.

Heinzel, P., et al. including **Watanabe, T.**: 2008, Hinode, TRACE, SOHO, and Ground-based Observations of a Quiescent Prominence, *ApJ*, **686**, 1383.

Hekker, S., et al. including **Kambe, E.**, **Ando, H.**, **Izumiura, H.**: 2008, Oscillations in Procyon A: First results from a multi-site campaign, *JPhCS*, **118**, 12059.

Hibi, Y., **Matsuo, H.**, Arai, H., Nagata, H., Ikeda, H., Fujiwara, M.: 2008, The cryogenic multiplexer and shift register for submillimeter-wave digital camera, Cryogenics, online, doi:10.1016/j.cryogenics.2008.11.008.

Higashi, Y., et al. including **Mizumoto, Y.**: 2008, Observation of Very High Energy Gamma Rays from HESS J1804-216 with CANGAROO-III Telescopes, *ApJ*, **683**, 957-966.

Hirashita, H., Kaneda, H., Onaka, T., **Suzuki, T.**: 2008, Far-Infrared Properties of Blue Compact Dwarf Galaxies Observed with AKARI/Far-Infrared Surveyor (FIS), *PASJ*, **60**, 477-488.

Hirata, N., et al. including **Sasaki, S.**: 2009, A survey of possible impact structures on 25143 Itokawa, *Icarus*, **200**, 486-502.

Hirota, T., et al. including **Bushimata, T.**, **Choi, Y. K.**, **Honma, M.**, **Iwadate, K.**, **Jike, T.**, **Kameya,O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kijima, M.**, **Kim, M. K.**, **Kobayashi, H.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**, **Miyazaki, A.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**, **Sato, K.**, **Sato, M.**, **Shibata, K. M.**, **Tamura, Y.**: 2008, Astrometry of H_2O Masers in Nearby Star-Forming Regions with VERA III. IRAS22198+6336 in Lynds1204G, *PASJ*, **60,** 961-974.

Honda, M., et al. including **Ishii, M.**, **Terada, H.**, **Takato, N.**, **Tamura, M.**, **Kudo, T.**: 2009, Detection of Water ICE Grains on the Surface of the Circumstellar Disk Around HD 142527, *ApJ*, **690**, L110-L113.

Honma, M., et al. including **Hirota, T.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kuji, S.**, **Manabe, S.**, **Miyaji, T.**: 2008, Dual-Beam Delay Calibration for VERA, *PASJ*, **60**, 935-950.

Honma, M., **Tamura, Y.**, Reid, M. J.: 2008, Tropospheric Delay Calibrations for VERA, *PASJ*, **60**, 951-960.

Hosokawa, T., **Omukai, K.**: 2009, Evolution of Massive Protostars with High Accretion Rates, *ApJ*, **691**, 823-846.

Hsieh, H. H., Jewitt, D., **Ishiguro, M.**: 2008, Physical Properties of Main-Belt Comet P/2005 U1 (Read), *AJ*, **137**, 157-168.

Ichimoto, K., et al. including **Suematsu, Y.**, **Tsuneta, S.**, **Katsukawa, Y.**: 2008, Polarization Calibration of the Solar Optical Telescope onboard Hinode, *SoPh*, **249**, 233.

Ichimoto, K., et al. including **Tsuneta, S.**, **Suematsu, Y.**, **Katsukawa, Y.**: 2008, Net circular polarization of sunspots in high spatial resolution, *A&A*, **481**, L9.

Iguchi, S., **Morita, K.-I.**, **Sugimoto, M.**, **Vila-Vilaro, B.**, **Saito, M.**, **Hasegawa, T.**, **Kawabe, R.**, **Tatematsu, K.**, Sakamoto, S., **Kiuchi, H.**, **Okumura, S. K.**, **Kosugi, G.**, **Inatani, J.**, Takakuwa, S., **Iono, D.**, **Kamazaki, T.**, **Ogasawara, R.**, **Ishiguro, M.**: 2009, The Atacama Compact Array (ACA), *PASJ*, **61**, 1-12.

Iguchi, S., **Okuda, T.**: 2008, The FFX Correlator, *PASJ*, **60**, 857-869.

Ikeda, H., et al. including **Watanabe, M.**, **Tamura, M.**, **Nakajima, Y.**, **Nakaya, H.**: 2008, Sequential Star Formation in a Cometary Globule (BRC37) of IC1396, *AJ*, **135**, 2323-2335.

Ikeda, N., Kitamura, Y., **Sunada, K.**: 2009, A Survey of Dense Cores in the Orion B Cloud, *ApJ*, **691**, 1560-1582.

Imada, A., et al. including **Ishioka, R.**, **Yamashita, T.**, **Okita, K.**, **Yoshida, M.**, **Yanagisawa, K.**: 2008, The 2006 November outburst of EG Aquarii: the SU UMa nature revealed, *PASJ*, **60**,

1151-1158.
Imada, S., **Hara, H.**, **Watanabe, T.**, **Asai, A.**, Minoshima, T., Harra, L. K., Mariska, J. T.: 2008, Non-Gaussian Line Profiles in a Large Solar Flare Observed on 2006 December 13, *ApJ*, **679**, L155-L159.
Imamura, T., Oyama, K., Iwata, T., Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, Futaana, Y., Nabatov, A.: 2008, The possibility of studying the lunar ionosphere with the SELENE radio science experiment, *EPS*, **60**, 60.
Imanishi, M., Nakagawa, T., Ohyama, Y., Shirahata, M., Wada, T., Onaka, T., **Oi, N.**: 2008, Systematic Infrared 2.5-5 Micron Spectroscopy of Nearby Ultraluminous Infrared Galaxies, *PASJ*, **60**, S489-S515.
Imanishi, M., **Nakanishi, K.**, **Tamura, Y.**, Peng, C.-H.: 2009, Nobeyama Millimeter Interferometric HCN(1–0) and HCO^+ (1–0) Observations of Further Luminous Infrared Galaxies, *AJ*, **137**, 3581-3598.
Innes, D. E., Attie, R., **Hara, H.**, Madjarska, M. S.: 2008, EIS/*Hinode* Observations of Doppler Flow Seen through the 40-Arcsec Wide-Slit, *SoPh*, **252**, 283.
Inoue, A. K., **Iwata, I.**: 2008, A Monte Carlo simulation of the intergalactic absorption and the detectability of the Lyman continuum from distant galaxies, *MNRAS*, **387**, 1681.
Inoue, T., Inutsuka, S.: 2008, Two-fluid MHD Simulations of Converging HI Flows in the Interstellar Medium. I: Methodology and Basic Results, *ApJ*, **687**, 303.
Inoue, T., Yamazaki, R., Inutsuka, S.: 2009, Turbulence and Magnetic Field Amplification in Supernova Remnants: Interactions Between A Strong Shock Wave and Multi-Phase Interstellar Medium, *ApJ*, **695**, 825.
Ishiguro, M., et al.: 2008, Report on the Kiso Cometary Dust Trail Survey, *AdSpR*, **43**, 875-879.
Ishikawa, R., et al. including **Tsuneta, S.**, **Katsukawa, Y.**, **Suematsu, Y.**: 2008, Transient horizontal magnetic fields in solar plage regions, *A&A*, **481**, L25.
Ishikawa, R., et al. including **Tsuneta, S.**, **Katsukawa, Y.**, **Suematsu, Y.**: 2009, Comparison of transient horizontal magnetic fields in a plage region and in the quiet Sun, *A&A*, **495**, 607.
Ishiyama, T., Fukushige, T., **Makino, J.**: 2008, Environmental Effect on the Subhalo Abundance – a Solution to the Missing Dwarf Problem, *PASJ*, **60**, L13.
Ita, Y., et al. including **Matsuura, M.**, **Hasegawa, T.**, **Tamura, M.**: 2008, AKARI IRC Survey of the Large Magellanic Cloud: Outline of the Survey and Initial Results, *PASJ*, **60**, S435-S451.
Ito, H., **Kino, M.**, **Kawakatu, N.**, Isobe, N., Yamada, S.: 2008, The Estimate of Kinetic Power of Jets in FR II Radio Galaxies: Existence of Invisible Components?, *ApJ*, **685**, 828-838.
Itoh, Y., **Hayashi, M.**, **Tamura, M.**, Oasa, Y., Hioki, T., Fukagawa, T., **Kudo, T.**: 2008, Near-Infrared Coronagraphic Observations of a Classical TTauri Star, DO Taurus, *PASJ*, **60**, 223-226.
Itoh, Y., **Tamura, M.**, **Hayashi, M.**, Oasa, Y., **Hayashi, S. S.**, Fukagawa, M., **Kudo, T.**, **Mayama, S.**, **Ishii, M.**, **Pyo, T.-S.**, Yamashita, T., **Morino, J.**: 2008, Near-Infrared Spectroscopy of Faint Companions around Young Stellar Objects Associated with the Taurus Molecular Cloud, *PASJ*, **60**, 209-218.
Iwakami, W., **Kotake, K.**, Ohnishi, N., Yamada, S., Sawada, K.: 2008, Three-Dimensional Simulations of Standing Accretion Shock Instability in Core-Collapse Supernovae, *ApJ*, **678**, 1207-1222.
Iwakami, W., Ohnishi, N., **Kotake, K.**, Yamada, S., Sawada, K.: 2008, Numerical methods for three-dimensional analysis of shock instability in supernova cores, *JPhCS*, **112**, 42021.
Iwata, I., Inoue, A. K., Matsuda, Y., **Furusawa, H.**, Hayashino, T., Kousai, K., Akiyama, M., Yamada, T., Burgarella, D., Deharveng, J.-M.: 2009, Detections of Lyman Continuum from Star-forming Galaxies at z~3 Through Subaru/Suprime-Cam Narrow-band Imaging, *ApJ*, **692**, 1287.
Izumiura, H., et al. including **Noguchi, K.**, **Aoki, W.**, **Ando, H.**, **Kambe, E.**, **Kawanomoto, S.**, **Tajitsu, A.**, **Okita, K.**, **Yoshida, M.**: 2008, Evidence for a Companion to BM Gem, a Silicate Carbon Star, *ApJ*, **682**, 499-508.
Johnson, J. A., et al. including **Narita, N.**, **Aoki, W.**, **Tamura, M.**: 2008, Measurement of the Spin-Orbit Angle of Exoplanet HAT-P-1b, *ApJ*, **686**, 649-657.
Jurcak, J., Bellot-Rubio, L.: 2008, Penumbral models in the light of *Hinode* spectropolarimetric measurements, *A&A*, **481**, L17.
Jurcak, J., **Katsukawa, Y.**: 2008, The properties of penumbral microjets inclination, *A&A*, **488**, L33.
Kadono, T., Arakawa, M., **Ito, T.**, Ohtsuki, K.: 2009, Spin rates of fast-rotating asteroids and fragments in impact disruption, *Icarus*, **200**, 694-697.
Kamohara, R., et al. including **Bushimata, T.**, **Choi, Y. K.**, **Hirota, T.**, **Honma, M.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kawaguchi, N.**, **Kim, M. K.**, **Kijima, M.**, **Kobayashi, H.**, **Kuji, S.**, **Manabe, S.**, **Miyaji, T.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**: 2008, VERA Observations of SiO Masers in the Symbiotic Star R Aquarii, *PASJ*, **60**, 1023-1029.
Kaneda, H., Onaka, T., Sakon, I., Kitayama, T., Okada,Y., **Suzuki, T.**: 2008, Properties of Polycyclic Aromatic Hydrocarbons in Local Elliptical Galaxies Revealed by the Infrared Spectrograph on Spitzer, *ApJ*, **684**, 270-281.
Kaneda, H., **Suzuki, T.**, Onaka, T., Okada, Y., Sakon, I.: 2008, Spatial Distributions of Dust and Polycyclic Aromatic Hydrocarbons in the Nearby Elliptical Galaxy NGC4589 Observed with AKARI, *PASJ*, **60**, 467-475.
Kano, R., et al. including **Hara, H.**, **Tsuneta, S.**, **Shimojo, M.**, **Shibasaki, K.**: 2008, The Hinode X-Ray Telescope (XRT): Camera Design, Perforance and Operations, *SoPh*, **249**, 263-279.
Kano, R., et al. including **Tsuneta, S.**, **Kotoku, J.**, **Hara, H.**, **Shimojo, M.**, **Shibasaki, K.**: 2008, Vertical Temperature Structures of the Solar Corona Derived with the *Hinode* X-Ray Telescope, *PASJ*, **60**, 827-834.
Karino, S., **Kino, M.**, Miller, J. M.: 2008, Funnel-Flow Accretion onto Highly Magnetized Neutron Stars and Shock Generation, *PThPh*, **119**, 739.
Kasliwal, M. M., Massey, R., Ellis, R. S., **Miyazaki, S.**, Rhodes, J.: 2008, A Comparison of Weak-Lensing Measurements from Ground- and Space Based Facilithes, *ApJ*, **684**, 34.
Kasuga, T., Jewitt, D.: 2008, Observations of 1999 YC and the Breakup of the Geminid Stream Parent, *AJ*, **36**, 881-889.
Kawada, M., et al. including **Matsuo, H.**: 2008, Performance of an Imaging Fourier Transform Spectrometer with Photoconductive

Detector Arrays: An Application for the AKARI Far-Infrared Instrument, *PASJ*, **60**, S389-S397.

Kawagoe, S., **Kajino, T.**, Suzuki, H., Sumiyoshi, K., Yamada, S.: 2008, Constraints on oscillation parameters through the MSW effect of supernova neutrinos, *JPhCS*, **120**, 52020.

Kawakatu, N., **Nagai, H.**, **Kino M.**: 2008, The Fate of Young Radio Galaxies: Decelerations Inside Host Galaxies?, *ApJ*, **687**, 141-155.

Kawakatu, N., **Nagai, H.**, **Kino, M.**: 2009, Fate of baby radio galaxies: Dead or alive?, *AN*, **330**, 283.

Kawakatu, N., Nagao, T., Woo, J.-H.: 2009, Exploring the Disk-Jet Connection from the Properties of Narrow-Line Regions in Powerful Young Radio-Loud Active Galactic Nuclei, *ApJ*, **693**, 1686-1695.

Kawakatu, N., **Wada, K.**: 2008, Coevolution of Supermassive Black Holes and Circumnuclear Disks, A*pJ*, **681**, 73-83.

Kawamura, S., et al. including **Seto, N.**, **Arai, K.**, **Fujimoto, M.-K.**, **Fukushima, M.**, **Ishizaki, H.**, **Kotake, K.**, **Ohishi, N.**, **Sakata, S.**, **Takahashi, R.**, **Yamazaki, T.**: 2008, The Japanese Space Gravitational Wave Antenna; DECIGO, *JPhCS*, **120**, 32004.

Kawamura, S., et al. including **Seto, N.**, **Arai, K.**, **Fujimoto, M.-K.**, **Fukushima, M.**, **Ishizaki, H.**, **Ohishi, N.**, **Sakata, S.**, T**akahashi, R.**, **Yamazaki, T.**: 2008, The Japanese space gravitational wave antenna - DECIGO, *JPhCS*, **122**, 12006.

Kawase, K., Kando, M., **Hayakawa, T.**, Daito, I., Kondo, S., Homma, T., Kameshima, T., Kotaki, H., Chen, L. M., Fukuda, Y.: 2008, Sub-MeV tunably polarized X-ray production with laser Thomson backscattering, *RScI*, **79**, 3302.

Kawazoe, F., Sato, S., Leonhardt, V., Miyakawa, O., Morioka, T., **Nishizawa, A.**, **Yamazaki, T.**, **Fukushima, M.**, **Kawamura, S.**, Sugamoto, A.: 2008, Experimental investigation of a control scheme for a tuned resonant sideband extraction interferometer for next-generation gravitational-wave detectors, *JPhCS*, **122**, 12017.

Kawazoe, F., Sugamoto, A., Leonhardt, V., Sato, S., **Yamazaki, T.**, **Fukushima, M.**, **Kawamura, S.**, Miyakawa, O., Somiya, K., Morioka, T., **Nishizawa, A.**: 2008, Experimental investigation of a control scheme for a zero-detuning resonant sideband extraction interferometer for next-generation gravitational-wave detectors, *CQGra*, **25**, 195008.

Kikuchi, F., et al. including **Liu, Q.**, **Hanada, H.**, **Kawano, N.**, **Matsumoto, K.**, **Goossens, S.**, **Asari, K.**, **Ishihara, Y.**, **Tsuruta, S.**, **Ishikawa, T.**, **Noda, H.**, **Sasaki, S.**: 2009, Pico-second Accuracy VLBI of the Two Sub-satellites of SELENE (KAGUYA) using Multi-Frequency and Same Beam Methods, *RaSc*, **44**, 1-7.

Kikuchi, F., **Liu, Q.**, **Matsumoto, K.**, **Hanada, H.**, **Kawano, N.**: 2008, Simulation analysis of differential phase delay estimation by same beam VLBI method, *EPS*, **60**, 391-406.

Kikuzawa, N., Hajima, R., Nishimori, N., Minehara, E., **Hayakawa, T.**, Shizuma, T., Toyokawa, H., Ohgaki, H.: 2009, Nondestructive Detection of Heavily Shielded Materials by Using Nuclear Resonance Fluorescence with a Laser-Compton Scattering Gamma-ray Source, *APExp*, **2**, 036502.

Kim, M. K., et al. including **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**: 2008, SiO Maser Observations toward Orion-KL with VERA, *PASJ*, **60**, 991-999.

Kim, Y.-H., Bong, S.-C., Park, Y.-D., Cho, K.-S., Moon, Y.-J., **Suematsu, Y.**: 2008, Estimation of Spicule Magnetic Field Using Observed MHD Waves by the Hinode SOT, *JKAS*, **41**, 173-180.

Kimura, K., **Iwashita, H.**, **Asayama, S.**, **Sugimoto, M.**, Kikuchi, G., **Ogawa, H.**: 2008, Antenna Performance of a Directory Dug Corrugated Feedhorn for the 150-GHz Bnad, *IJIMW*, **29**, 713-723.

Kino, M., Ito, H., **Kawakatu, N.**, **Nagai, H.**: 2009, New prediction of extragalactic GeV γ-ray emission from radio lobes of young AGN jets, *MNRAS*, **395**, 43-47.

Kino, M., **Kawakatu, N.**, Ito, H., **Nagai, H.**: 2009, High energy emission from AGN cocoons in clusters of galaxies, *AN*, **330**, 257-260.

Kiuchi, K., **Kotake, K.**: 2008, Equilibrium Configurations of Strongly Magnetized Neutron Stars with Realistic Equations of State, *MNRAS*, **385**, 1327-1347.

Kobayashi, N., Yasui, C., Tokunaga, A. T., **Saito, M.**: 2008, Star Formation in the Most Distant Molecular Cloud in the Extreme Outer Galaxy: A Laboratory of Star Formation in an Early Epoch of the Galaxy's Formation, *ApJ*, **683**, 178.

Kohno, K., et al. including **Tosaki, T.**, **Muraoka, K.**, **Sawada, T.**, **Nakanishi, K.**, **Kuno, N.**, **Sakai, T.**, **Tanaka, K.**, **Okuda, T.**, **Ezawa, H.**, **Kamazaki, T.**, **Yamaguchi, N.**, **Fukuhara, M.**, **Iono, D.**, **Kawabe, R.**: 2008, ASTE CO(3–2) Observations of the Southern Barred Spiral Galaxy NGC 986: a Large Gaseous Bar Filled with Dense Molecular Medium, *PASJ*, **60**, 457-464.

Kojima, K., Ichiki, K., **Yamazaki, D. G.**, **Kajino, T.**, Mathews, G. J.: 2008, Neutrino mass effects on vector and tensor CMB anisotropies in the presence of a primordial magnetic field, *PhRvD*, **78**, 45010.

Kokeyama, K., Sato, S., Nishizawa, A., **Kawamura, S.**, Chen, Y., Ward, R., Pai, P., Somiya, K., Sugamoto, A.: 2008, The experimental plan of displacement- and frequency-noise free laser interferometer, *JPhCS*, **122**, 12022.

Kokeyama, K., Somiya, K., Kawazoe, F., Sato, S., **Kawamura, S.**, Sugamoto, A.: 2008, Development of signal-extraction scheme for Resonant Sideband Extraction, *CQGra*, **25**, 235013.

Komugi, S., Sofue, Y., Kohno, K., Nakanishi, H., **Onodera, S.**, Egusa, F., **Muraoka, K.**: 2008, Molecular Gas Distribution in Barred and Non-Barred Galaxies along the Hubble Sequence, *A&A*, **178**, 225-246.

Koyama, Y., **Kodama, T.**, Shimasaku, K., Okamura, S., Tanaka, M., Lee, H. M., Im, M., Matsuhara, H., Takagi, T., Wada, T., Oyabu, S.: 2008, Mapping dusty star formation in and around a cluster at z=0.81 by wide-field imaging with AKARI, *MNRAS*, **391**, 1758-1770.

Koyama, H., **Nagashima, M.**, Kakehata, T., Yoshii, Y.: 2008, Dynamical response to supernova-induced gas removal in spiral galaxies with dark matter halo, *MNRAS*, **389**, 237.

Krause, O., Birkmann, S. M., **Usuda, T.**, **Hattori, T.**, Goto, M., Rieke, G. H., Misselt, K. A.: 2008, The Cassiopeia A Supernova Was of Type Iib, *Science*, **320**, 1195-1197.

Krause, O., Tanaka, M., **Usuda, T.**, **Hattori, T.**, Goto, M., Birkmann, S., Nomoto, K.: 2009, Tycho Brahe's 1572 supernova as a standard typeIa as revealed by its light-echo spectrum, *Nature*, **456**, 617-619.

Kubo, M., et al. including **Suematsu, Y.**, **Katsukawa, Y.**, **Tsuneta, S.**: 2008, Disintegration of Magnetic Flux in Decaying Sunspots as Observed with the Hinode SOT, *ApJ*, **681**, 1677.

Kudoh, T., Basu, S.: 2008, Three-dimensional Simulation of Magnetized Cloud Fragmentation Induced by Nonlinear Flows and Ambipolar Diffusion, *ApJ*, **679**, L97.

Kun, M., Balog, Z., **Mizuno, N.**, Kawamura, A., Gáspár, A., Kenyon, S. J., Fukui, Y.: 2008, Lynds 1622: a nearby star-forming cloud projected on Orion B?, *MNRAS*, **391**, 84-94.

Kuno, N., **Nakanishi, K.**, **Sorai, K.**, Shibatsuka, T.: 2008, Central Spiral Structure of Molecular Gas in Maffei 2, *PASJ*, **60**, 475-485.

Kuo, C.-Y., Shum, C. K., Guo, J. Yi, Y., Braun, A., Fukumori, I., **Matsumoto, K.**, Sato, T., Shibuya, K.: 2008, Southern Ocean mass variation studies using GRACE and satellite altimetry, *EP&S*, **60**, 477–485.

Kusakabe, M., **Kajino, T.**, Boyd, R. N., **Yoshida, T.**, Mathews, G. J.: 2008, The X- Solution to the ^{6}Li and ^{7}Li Big Bang Nucleosynthesis Problems, *ApJ*, **680**, 846-857.

Kusakabe, N., **Tamura, M.**, **Kandori, R.**, **Hashimoto, J.**, **Nakajima, Y.**, Nagata, T., Nagayama, T., Hough, J., Lucas, P.: 2008, Near-Infrared Imaging Polarimetry of M42: Aperture Polarimetry of Point-Like Sources, *AJ*, **136**, 621-630.

Kuwahara, T., et al. including **Asayama, S.**, **Mizuno, N.**: 2008, Ground-based millimeter-wave observations of water vapor emission (183 GHz) at Atacama, Chile, *AdSpR*, **42**, 1167-1171.

Lapi, A., **Kawakatu, N.**, Bosnjak, Z., Celotti, A., Bressan, A., Granato, G. L., Danese, L.: 2008, Long gamma-ray bursts and their host galaxies at high redshift, *ApJ*, **386**, 608-618.

Li, J., Shen, Z.-Q., **Miyazaki, A.**, Huang, L., Sault, R. J., **Miyoshi, M.**, Tsuboi, M., Tsutsumi, T.: 2008, The variability of Sagittarius A at 3-millimeters, *JPhCS*, **131**, 012007.

Liu, Y-J., Sato, B., Zhao, G., **Ando, H.**: 2009, A planetary com-panion orbiting the intermediate-mass G giant HD173416, *RAA*, **9**, 1-4.

Lucas, P. W., et al. including **Tamura, M.**: 2008, The UKIDSS Galactic Plane Survey, *MNRAS*, **391**, 136-163.

Lucas, P. W., Hough, J. H., Bailey, J. A., **Tamura, M.**, Hirst, E., Harrison, D.: 2009, Planetpol polarimetry of the exoplanet systems 55 Cnc and τ Boo, *MNRAS*, **393**, 229-244.

Machida, M., Matsumoto, R.: 2008, Excitation of Low-Frequency QPOs in Black-Hole Accreetion Flows, *PASJ*, **60**, 613.

Machida, M. N., **Kokubo, E.**, Inutsuka, S., Matsumoto, T.: 2008, Angular Momentum Accretion onto a Gas Giant Planet, *ApJ*, **685**, 1220-1236.

Machida, M. N., **Omukai, K.**, Matsumoto, T., Inutsuka, S.: 2008, Conditions for the Formation of First-Star Binaries, *ApJ*, **677**, 813-827.

Machida, M. N., **Tomisaka, K.**, Matsumoto, T., Inutsuka, S.-I.: 2008, Formation Scenario for Wide and Close Binary Systems, *ApJ*, **677**, 327-347.

Maciejewski, A., Przybylska, M., **Yoshida, H.**: 2008, Necessary conditions for super-integrability of Hamiltonian systems, *PhLA*, **372**, 5581-5587.

Maeda, K., Kawabata, K., Li, W., Tanaka, M., Mazzali, P. A., **Hattori, T.**, Nomoto, K., Filippenko, A. V.: 2009, Subaru and Keck Observations of the Peculiar Type Ia Supernova 2006GZ at Late Phases, *ApJ*, **690**, 1745-1752.

Maeda, T., et al. including **Kobayashi, H.**, **Shibata, K. M.**, **Bushimata, T.**, **Choi, Y. K.**, **Hirota, T.**, **Honma, M.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kuji, S.**, **Manabe, S.**, **Miyaji, T.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**, **Sato, K.**, **Tamura, Y.**: 2008, A Bipolar Outflow of the M-Type Giant IRC -10414 Traced by H_2O Maser Emission, *PASJ*, **60**, 1057-1067.

Magara, T.: 2008, Investigation into the subsurface magnetic structure in an emergng flux region on the Sun based on a comparison between *Hinode*'s observations and numerical simulations, *ApJL*, **685**, L91.

Magara, T.: 2008, Emergence of a Partially Split Flux Tube into the Solar Atmosphere, *PASJ*, **60**, 809.

Magara, T., **Tsuneta, S.**: 2008, *Hinode*'s Observational Result on the Saturation of Magnetic Helicity Injected into the Solar Atmosphere and Its Relation to the Occurrence of a Solar Flare, *PASJ*, **60**, 1181.

Mallama, A., **Sôma, M.**, Sada, P. V., Modic, R. J., Ellington, C. K.: 2008, Astrometry of Iapetus, Ariel, Umbriel, and Titania from eclipses and occultations, *Icarus*, **200**, 265-270.

Mariska, J. T., Warren, H. P., Williams, D. R., **Watanabe, T.**: 2008, Observations of Doppler Shift Oscillations with the EUV Imaging Spectrometer on *Hinode*, *ApJL*, **681**, L41.

Matsumoto, H., Sakon, I., Onaka, T., Sako, S., Miyata, T., Kataza, H., Okada, Y., Okamoto, Y. K., Honda, M., **Yamashita, T.**, Takahashi, H., **Fujiyoshi, T.**: 2008, Mid-Infrared Observations of Planetary Nebula BD +30 3639: Evolution and Distribution of Unidentified IR Band Carriers, *ApJ*, **677**, 1120-1131.

Matsumoto, K., **Hanada, H.**, Namiki, N., **Iwata, T.**, **Goossens, S.**, **Tsuruta, S.**, **Kawano, N.**, Rowlands, D. D.: 2008, A simulation study for anticipated accuracy of lunar gravity field model by SELENE tracking data, *AdSpR*, **42**, 331-336.

Matsumoto, N., et al. including **Bushimata, T.**, **Choi, Y. K.**, **Hirota, T.**, **Honma, M.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kobayashi, H.**, **Kuji, S.**, **Manabe, S.**, **Miyaji, T.**, **Oh, C. S.**, **Oyama, T.**, **Sakai, S.**, **Sato, K.**, **Shibata, K. M.**, **Tamura, Y.**: 2008, Variable Asymmetry of the Circumstellar Envelope in IK Tauri Traced by SiO Maser Emission, *PASJ*, **60**, 1039-1050.

Matsumoto, T., et al. including **Tsuneta, S.**, **Suematsu, Y.**, **Katsukawa, Y.**: 2008, Cooperative Observation of Ellerman Bombs between the Solar Optical Telescope aboard Hinode and Hida/Domeless Solar Telescope, *PASJ*, **60**, 577.

Matsunaga, N., Mito, H., Nakada, Y., Fukushi, H., Tanabe, T., **Ita, Y.**, **Izumiura, H.**, **Matsuura, M.**, Ueta, T., Yamamura, I.: 2008, An AKARI Search for Intracluster Dust of Globular Clusters, *PASJ*, **60**, S415-S428.

Matsuo, H., Mori, Y., Murakoshi, Y., Ariyoshi, S., **Ezawa, H.**, **Hibi, Y.**, Kobayashi, J., Nagata, H., Nakahashi, M., Otani, C.: 2008, Realization of Submillimeter-Wave Imaging Array with Superconducting Direct Detectors, *JLTP*, **151**, 304-309.

Matsuo, T., Shibai, H., Kawada, M., Hattori, M., Ohta, I. S., **Matsuo, H.**: 2008, Novel Spectral Imaging Method for Fizeau Interferometers, *PASJ*, **60**, 303-314.

Matsuoka, Y., Peterson, B. A., Oyabu, S., Kawara, K., **Asami, N.**, Sameshima, H., Ienaka, N., Nagayama, T., **Tamura, M.**: 2008, Optical to Near-Infrared Spectrum of a Massive Evolved Galaxy at $z = 1.26$, *ApJ*, **685**, 767-772.

Matsushita, S., et al. including **Iono, D.**: 2009, SMA ^{12}CO(J=6–5) and 435 μm Interferometric Imaging of the Region of Arp 220, *ApJ*, **693**, 56-68.

McGrath, E. J., Stockton, A., Canalizo, G., **Iye, M.**, Maihara, T.: 2008, Morphologies and Color Gradients of Luminous Evolved Galaxies at $z \sim 1.5$, *ApJ*, **682**, 303-318.

Minamidani, T., et al. including **Mizuno, N.**, **Hasegawa, T.**, **Tatematsu, K.**, **Yamaguchi, N.**: 2008, Submillimeter Observations of Giant Molecular Clouds in the Large Magellanic Cloud: Temperature and Density as Determined from J=3–2 and J=1–0 Transitions of CO, *ApJS*, **175**, 485-508.

Mitra-Kraev, U., Kosovichev, A. G., **Sekii, T.**: 2008, Properties of high-degree oscillation modes of the Sun observed with *Hinode*/SOT, *A&A*, **481**, L1.

Miyachi, T., et al. including **Sasaki, S.**: 2008, Measurement of temperature after hypervelocity collision of microparticles in the range from 10 to 40 km/s, *ApPhL*, **93**, 174107.

Miyawaki, R., **Hayashi, M.**, **Hasegawa, T.**: 2009, A Large-Scale ^{13}CO Mapping of the W 49 A Molecular Cloud Complex, *PASJ*, **61**, 39-49.

Morinaga, S., **Sakurai, T.**, Ichimoto, K., Yokoyama, T., **Shimojo, M.**, **Katsukawa, Y.**: 2008, Suppression of convection around small magnetic concentrations as revealed by *Hinode* spectropolarimetric observations, *A&A*, **481**, L29-L32.

Motogi, K., et al. including **Honma, M.**, **Yamauchi, A.**, **Kobayashi, H.**, **Shibata, K. M.**: 2008, Microstructure and kinematics of H_2O masers in the massive star-forming region IRAS 06061+2151, *MNRAS*, **390**, 523-534.

Murakami, N., Uemura, R., Baba, N., **Nishikawa, J.**, **Tamura, M.**, Hashimoto, N., Abe, L.: 2008, An Eight-Octant Phase-Mask Coronagraph, *PASP*, **120**, 1112-1118.

Murakami, N., Uemura, R., Baba, N., Sato, Y., **Nishikawa, J.**, **Tamura, M.**: 2008, Four-Quadrant Phase Mask Coronagraph with a Jacquinot-Lyot Stop, *ApJ*, **677**, 1425-1432.

Murakawa, K., Ohnaka, K., Driebe, T., Hofmann, K.-H., **Oya, S.**, Schertl, D., Weigelt, G.: 2008, Near-IR bispectrum speckle interferometry, AO imaging polarimetry, and radiative transfer modeling of the proto-planetary nebula Frosty Leonis, *A&A*, **489**, 195-206.

Murakawa, K., **Oya, S.**, **Pyo, T.-S.**, **Ishii, M.**: 2008, Near-infrared multiwavelength imaging polarimetry of the low-mass protostellar object HL Tauri, *A&A*, **492**, 731-734.

Murakawa, K., Preibisch, T., Kraus, S., Ageorges, N., Hofmann, K.-H., **Ishii, M.**, **Oya, S.**, Rosen, A., Schertl, D., Weigelt, G.: 2008, VLT/NACO and Subaru/CIAO JHK-band high-resolution imaging polarimetry of the Herbig Be star R Monocerotis, *A&A*, **488**, L75-78.

Nagae, O., Kawabata, K. S., Fukazawa, Y., Okazaki, A., **Isogai, M.**, **Yamashita, T.**: 2009, Multiepoch Optical Spectropolarimetry of Three Microquasars, Cyg X-1, LS 5039, and LS I +61°303, *AJ*, **137**, 3509-3519.

Nagai, H., Asada, K., Doi, A., Kameno, S., **Inoue, M.**: 2009, Probing the nature of multiple lobe-like emissions in 3C 84, *AN*, **330**, 161.

Nagao, T., et al. including **Kashikawa, N.**: 2008, A Photometric Survey for Lyα-He II Dual Emitters: Searching for Population III Stars in High-Redshift Galaxies, *ApJ*, **680**, 100-109.

Nagashima, K., **Sekii, T.**, Kosovichev, A. G., Zhao, J., Tarbell, T. D.: 2009, Helioseismic Signature of Chromospheric Downflows in Acoustic Travel-Time Measurements From *Hinode*, *ApJL*, **694**, L115.

Nagata, H., **Matsuo, H.**, **Hibi, Y.**, Kobayashi, J., Nakahashi, M., Ikeda, H., Fujiwara, M.: 2008, GaAs cryogenic readout electronics for high impedance detector arrays for far-infrared and submillimeter wavelength region, Cryogenics, online, doi:10.1016/j.cryogenics.2008.12.023.

Nagata, S., et al. including **Tsuneta, S.**, **Suematsu, Y.**, **Katsukawa, Y.**, **Orozco Suárez, D.**: 2008, Formation of Solar Magnetic Flux Tubes with Kilogauss Field Strength Induced by Convective Instability, *ApJL*, **677**, L145.

Nagayama, T., et al. including **Honma, M.**, **Kawaguchi, N.**, **Kobayashi, H.**: 2008, H_2O Maser Outflow from the Red Supergiant Star NML Cygni Observed with Japanese VLBI Network, *PASJ*, **60**, 1069-1075.

Nakagawa, A., et al. including **Bushimata, T.**, **Choi, Y. K.**, **Hirota, T.**, **Honma, M.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kijima, M.**, **Kim, M. K.**, **Kobayashi, H.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**, **Oyama, T.**, **Pradel, N.**, **Sakai, S.**, **Sato, K.**, **Sato, M.**, **Shibata, K. M.**, **Tamura, Y.**, **Ueno, M.**, **Yamashita, K.**: 2008, VLBI Astrometry of AGB Variables with VERA – A Semiregular Variable S Crateris –, *PASJ*, **60**, 1013-1021.

Nakajima, T., **Sakai, T.**, **Asayama, S.**, Kimura, K., Kawamura, M., Yonekura, Y., **Ogawa, H.**, **Kuno, N.**, **Noguchi, T.**, Tsuboi, M., **Kawabe, R.**: 2008, A New 100-GHz Band Front-End System with a Waveguide-Type Dual-Polarization Sideband-Separating SIS Receiver for the NRO 45-m Radio Telescope, *PASJ*, **60**, 435-443.

Nakajima, Y., **Kandori, R.**, **Tamura, M.**, Nagata, T., Sato, S., Sugitani, K.: 2008, Mapping the Dust Column Density in Dark Clouds by Using NIR Scattered Light: Case of the Lupus 3 Dark Cloud, *PASJ*, **60**, 731-737.

Nakamori, T., et al. including **Mizumoto, Y.**: 2008, Observation of an Extended Very High Energy Gamma-Ray Emission from MSH 15-52 with CANGAROO-III, *ApJ*, **677**, 297-305.

Nakamura, T., **Yoshida, F.**: 2008, A New Surface Density Model of Jovian Trojans around Triangular Libration Points, *PASJ*, **60**, 293-296.

Namekata, D., Habe, A., **Matsui, H.**, **Saitoh, T. R.**: 2008, Mass Supply to Galactic Center due to Nested Bars in the Galaxy, *ApJ*, **691**, 1525-1539.

Namiki, N., **Iwata, T.**, **Matsumoto, K.**, **Hanada, H.**, **Noda, H.**, **Goossens, S.**, Ogawa, M., **Kawano, N.**, **Asari, K.**, **Tsuruta, S.**, **Ishihara, Y.**, **Liu, Q.**, **Kikuchi, F.**, **Ishikawa, T.**, **Sasaki, S.**, Aoshima, C., Kurosawa, K., Sugita, S., Takano, T.: 2009, Far side gravity field of the Moon from four-way Doppler measurements of SELENE (Kaguya), *Science*, **323**, 900-905.

Narita, N., Sato, B., Ohshima, O., Winn, J. N.: 2008, A Possible Spin-Orbit Misalignment in the Transiting Eccentric Planet HD 17156b, *PASJ*, **60**, L1-L5.

Naruse, M., **Ito, T.**, **Sekimoto, Y.**, Toba , H., **Satou, N.**, **Sugimoto, M.**, Shan, W., **Iizuka, Y.**, Kamba, T., **Kamikura, M.**, **Serizawa, Y.**: 2009, Near-Field Beam Pattern Measurement of Qualification Model of ALMA Band 8 (385–500 GHz) Cartridge Receiver, *ExA*, **24**, 89-107.

Nishida, K., Shimizu, M., Shiota, D., Takasaki, H., **Magara, T.**, Shibata, K.: 2009, Numerical Examination of Plasmoid-Induced Reconnection Model for Solar Flares: the Relation Between Plasmoid Velocity and Reconnection Rate, *ApJ*, **690**, 748.

Nishikawa, J., Abe, L., **Murakami, N.**, Kotani, T.: 2008, Precise wavefront correction with an unbalanced nulling interferometer for exo-planet imaging coronagraphs, *A&A*, **489**, 1389-1398.

Nishikawa, T., Takami, M., **Hayashi, M.**, Wiseman, J., **Pyo, T.-S.**: 2008, SUBARU High-Dispersion Spectroscopy of Hα and [N II] 6583 Å Emission in the HH 46/47 Jet, *ApJ*, **684**, 1260-1272.

Nishiyama, S., Nagata, T., **Tamura, M.**, **Kandori, R.**, Hatano, H., Sato, S., Sugitani, K.: 2008, The Interstellar Extinction Law toward the Galactic Center. II. V, J, H, and K_S Bands, *ApJ*, **680**, 1174-1179.

Nishiyama, S., et al. including **Tamura, M.**, **Kandori, R.**, **Nakajima, Y.**, **Kusakabe, N.**: 2009, Magnetic Field Configuration at the Galactic Center Investigated by Wide Field Near-Infrared Polarimetry, *ApJ*, **690**, 1648-1658.

Nishizawa, A. J., Komatsu, E., Yoshida, N., Takahashi, R., **Sugiyama, N.**: 2008, Cosmic Microwave Background-Weak Lensing Correlation: Analytical and Numerical Study of Non-linearity and Implications for Dark Energy, *ApJ*, **676**, L93-L96.

Nishizawa, A., **Kawamura, S.**, Sakagami, M.: 2008, Quantum noise in differential-type gravitational-wave interferometer and signal recycling, *JPhCS*, **122**, 12019.

Nishizawa, A., **Kawamura, S.**, Akutsu, T., **Arai, K.**, **Yamamoto, K.**, **Tatsumi, D.**, **Nishida, E.**, Sakagami, M.-A., Chiba, T., **Takahashi, R.**, **Sugiyama, N.**: 2008, Optimal location of two laser-interferometric detectors for gravitational wave backgrounds at 100 MHz, *CQGra*, **25**, 225011.

Nishizawa, A., **Kawamura, S.**, Sakagami, M.: 2008, Resonant Speed Meter for Gravitational-wave Detection, *PRL*, **101**, 81101.

Nishizawa, A., Komatsu, E., Yoshida, N., **Takahashi, R.**, **Sugiyama, N.**: 2008, Cosmic Microwave Background – Weak Lensing correlation: Analytical and Numerical study of Non-linearity and Implications of Dark Energy, *ApJL*, **676L**, 93.

Nishizuka, N., **Asai, A.**, Takasaki, H., Kurokawa, H., Shibata, K.: 2009, The Power-Law Distribution of Flare Kernels and Fractal Current Sheets in a Solar Flare, *ApJ*, **694**, L74-L78.

Nishizuka, N., Shimizu, M., Nakamura, T., Otsuji, K., **Okamoto, T. J.**, **Katsukawa, Y.**, Shibata, K.: 2008, Giant Chromospheric Anemone Jet Observed with *Hinode* and Comparison with Magnetohydrodynamic Simulations: Evidence of Propagating Alfvén Waves and Magnetic Reconnection, *ApJL*, **683**, L83.

Nitadori, K., **Makino, J.**: 2008, Sixth- and eighth-order Hermite integrator for *N*-body simulations, *NewA*, **13**, 498-507.

Noda, H., **Araki, H.**, **Goossens, S.**, **Ishihara, Y.**, **Matsumoto, K.**, **Tazawa, S.**, **Kawano, N.**, **Sasaki, S.**: 2008, Illumination conditions at the lunar polar regions by KAGUYA (SELENE) laser altimeter, *GRL*, **35**, L24203.

Noda, H., Heki, K., **Hanada, H.**: 2008, In situ Lunar Orientation Measurement (ILOM): Simulation of observation, *AdSpR*, **42**, 358-362.

Oasa, Y., **Tamura, M.**, **Sunada, K.**, Sugitani, K.: 2008, Luminosity and Mass Functions at the Very Low Mass Side in NGC 1333, *AJ*, **136**, 1372-1387.

Oda, T., Totani, T., Yasuda, N., Sumi, T., **Morokuma, T.**, Doi, M., **Kosugi, G.**: 2008, Implications for Galaxy Evolution from Cosmic Evolution of the Supernova Rate Density, *PASJ*, **60**, 169-182.

Ohishi, M.: 2008, Recent Topics on Organic Matters in Space through Astronomical Observations, *Viva Origino*, **36**, 51-54.

Ohnaka, K., Izumiura, H., Leinert, Ch., Driebe, T., Weigelt, G., Wittkowski, M.: 2008, Asymmetric silicate dust distribution toward the silicate carbon star BM Geminorum, A&A, 490, 173-178.

Ohnishi, N., **Iwakami, W.**, Kotake, K., Yamada, S., Fujioka, S., Takabe, H.: 2008, Standing accretion shock instability: numerical simulations of core-collapse supernova, *JPhCS*, 42018

Ohtsuka, K., **Ito, T.**, Yoshikawa, M., Asher, D. J., Arakida, H.: 2008, Katsuhito Ohtsuka, Takashi Ito, Makoto Yoshikawa, Quasi-Hilda comet 147P/Kushida-Muramatsu - Another long temporary satellite capture by Jupiter, *A&A*, **489**, 1355-1362.

Ohtsuka, K., Yoshikawa, M., **Watanabe, J.**, Hidaka, E., Murayama, H., **Kasuga, T.**: 2008, On the Substantial Spatial Spread of the Quadrantid Meteoroid Stream, *EM&P*, **102**, 179-182.

Ohtsuki, S., Iwagami, N., Sagawa, H., Ueno, M., Kasaba, Y., Imamura, T., **Yanagisawa, K.**, Nishihara, E.: 2008, Distributions of the Venus 1.27-μm O_2 airglow and rotational temperature, *P&SS*, **56**, 1391.

Ojha, D. K., **Tamura, M.**, **Nakajima, Y.**, **Saito, H.**, Pandey, A. K., Ghosh, S. K., **Aoki, K.**: 2009, Young Brown Dwarfs in the Core of the W3 Main Star-Forming Region, *ApJ*, **693**, 634-647.

Oka, T., **Hasegawa, T.**, White, G. J., Sato, F., Tsuboi, M., **Miyazaki, A.**: 2008, Aperture Synthesis Imaging of a High-Velocity Compact Cloud near the Galactic Center, *PASJ*, **60**, 429-434.

Okamoto, S., **Arimoto, N.**, **Yamada, Y.**, Onodera, M.: 2008, A Suprime-Cam study of the stellar population of the Ursa Major I dwarf spheroidal galaxy, *A&A*, **487**, 103-108.

Okuda, T., **Iguchi, S.**: 2008, Performance Measurements of 8-Gbos 1-bit ADCs Developed for Wideband Radio Astronomical Observation, *PASJ*, **60**, 315-325.

Omukai, K., Schneider, R., Haiman, Z.: 2008, Can Supermassive Black Holes Form in the Metal-Enriched High-redshift Protogalaxies?, *ApJ*, **686**, 801-814.

Orozco Suárez, D., Bellot Rubio, L. R., del Toro Iniesta, J. C., **Tsuneta, S.**: 2008, Magnetic field emergence in quiet Sun granules, *A&A*, **481**, L33.

Oshima, T., Yamakawa, Y., Kurabayashi, H., Hoshino, A., Ishisaki, Y., Ohashi, T., Mitsuda, K., Tanaka, K.: 2008, A High Energy Resolution Gamma-Ray TES Microcalorimeter with Fast Response Time, *JLTP*, **151**, 430-435.

Ota, K., et al. including **Iye, M.**, **Kashikawa, N.**, **Kobayashi, M.**,

Nagashima, M., **Morokuma, T.**, **Furusawa, H.**, **Hattori, T.**: 2008, Reionization and Galaxy Evolution Probed by z = 7 Lyα Emitters, *ApJ*, **677**, 12-26.

Ota, N., Murase, K., Kitayama, T., Komatsu, E., Hattori, M., **Matsuo, H.**, **Oshima, T.**, Suto, Y., Yoshikawa, K.: 2008, Suzaku broad-band spectroscopy of RX J1347.5-1145: constraints on the extremely hot gas and non-thermal emission, *A&A*, **491**, 363-377.

Otsuka, M., **Izumiura, H.**, **Tajitsu, A.**, Hyung, S.: 2008, Detection of Fluorine in the Halo Planetary Nebula BoBn 1: Evidence for a Binary Progenitor Star, *ApJ*, **682**, L105-L108.

Ouchi, M., et al. including **Furusawa, H.**, **Sekiguchi, K.**, **Kodama, T.**, **Kashikawa, N.**, **Iye, M.**, **Takata, T.**, **Yoshida, M.**: 2008, The Subaru/XMM-Newton Deep Survey (SXDS). IV. Evolution of Lyα Emitters from z=3.1 to 5.7 in the 1 deg2 Field: Luminosity Functions and AGN, *ApJS*, **176**, 301-330.

Oya, S.: 2009, Measurement of the vibrating shape of a bimorph deformable mirror using a laser displacement sensor, *OptEn*, **48**, 33601.

Oyama, T., **Miyoshi, M.**, **Deguchi, S.**, Imai, H., Shen, Z. Q.: 2008, A Measurement of the Proper Motions of SiO Maser Sources in the Galactic Center with VLBA, *PASJ*, **60**, 11-22.

Park, S. Q., et al. including **Miyazaki, S.**: 2008, AEGIS: Radio and Mid-Infrared Selection of Obscured AGN Candidates, *ApJ*, **678**, 744.

Petrova, N., Gusev, A., **Hanada, H.**, **Kawano, N.**: 2008, Free librations of the two-layer Moon and the possibilities of their detection, *AdSpR*, **42**, 1398-1404.

Pevtsov, A. A., Canfield, R. C., **Sakurai, T.**, **Hagino, M.**: 2008, On the Solar Cycle Variation of the Hemispheric Helicity Rule, *ApJ*, **677**, 719-722.

Pineda, J. L., et al. including **Mizuno, N.**: 2008, Submillimeter line emission from LMC N159W: a dense, clumpy PDR in a low metallicity environment, *A&A*, **482**, 197-208.

Pinfield, D. J., et al. including **Tamura, M.**, **Ishii, M.**, **Nakajima, T.**: 2008, Fifteen new T dwarfs discovered in the UKIDSS Large Area Survey, *MNRAS*, **390**, 304-322.

Pohjolainen, S., Hori, K., **Sakurai, T.**: 2008, Radio Bursts Associated with Flare and Ejecta in the 13 July 2004 Event, *SoPh*, **253**, 291-303.

Portigies Zwart, S., et al. including **Fujii, M.**: 2009, A multiphysics and multiscale software environment for modeling astrophysical systems, *NewA*, **14**, 369-378.

Prescott, M. K. M., **Kashikawa, N.**, Dey, A., Matsuda, Y.: 2008, The Overdense Environment of a Large Lyα Nebula at $z \sim 2.7$, *ApJ*, **678**, L77-80.

Pyo, T.-S., **Hayashi, M.**, Kobayashi, N., **Terada, H.**, Tokunaga, A. T.: 2009, Spatio-Kinematic Structure at the Base of the [Fe II] Jets from L1551 IRS 5, *ApJ*, **694**, 654-663.

Reid, M. J., Broderick, A. E., Loeb, A., **Honma, M.**, Brunthaler, A.: 2008, Limits on the Position Wander of Sgr A*, *ApJ*, **682**, 1041-1046.

Richmond, M. W., **Morokuma, T.**, Doi, M., **Komiyama, Y.**, Yasuda, N., Okamura, S., Gal-Yam, A.: 2009, Proper Motions with Subaru I. Methods and a First Sample in the Subaru Deep Field, *PASJ*, **61**, 97-107.

Rioja, M. J., Dodson, R., **Kamohara, R.**, Colomer, F., Bujarrabal, V., **Kobayashi, H.**: 2008, Relative Astrometry of the J = 1≥0, v = 1 and v = 2 SiO Masers toward R Leonis Minoris Using VERA, P*ASJ*, **60**, 1031-1038.

Robson, I. E., et al. including **Sekiguchi, K.**: 2008, Commission 55: Communicating Astronomy with the Public, *IAUTA*, **27**, 460-464.

Rosat, S., **Fukushima, T.**, Sato, T., **Tamura, Y.**: 2008, Application of a Non-linear Damped Harmonic Analysis Method to the Normal Modes of the Earth, *JGeo*, **45**, 63-71.

Saito, H., **Saito, M.**, Yonekura, Y., Nakamura, F.: 2008, High-Resolution Studies of the Multiple-Core Systems toward Cluster-forming Regions Including Massive Stars, *ApJS*, **178**, 302-329.

Saito, H., **Tamura, M.**, **Kandori, R.**, **Kusakabe, N.**, **Hashimoto, J.**, **Nakajima, Y.**, **Sato, Y.**, Nagata, T., Nagayama, T., Kato, D.: 2009, Near-Infrared Imaging Polarimetry of S106 Cluster-Forming Region with SIRPOL, *AJ*, **137**, 3149-3157.

Saitoh, T. R., **Daisaka, H.**, **Kokubo, E.**, **Makino, J.**, Okamoto, T., **Tomisaka, K.**, **Wada, K.**, Yoshida, N.: 2008, Toward First-Principle Simulations of Galaxy Formation: I. How Should We Choose Star-Formation Criteria in High-Resolution Simulations of Disk Galaxies?, *PASJ* , **60**, 667-681.

Sakai, T., Sakai, N., Kamegai, K., **Hirota, T.**, **Yamaguchi, N.**, Shiba, S., Yamamoto, S.: 2008, A Molecular Line Observation toward Massive Clumps Associated with Infrared Dark Clouds, *ApJ*, **678**, 1049-1069.

Sakamoto, Y., **Tsuneta, S.**, Vekstein, G.: 2008, Observational Appearance of Nanoflares by SXT and TRACE, *ApJ*, **689**, 1.

Sakata, S., Leonhardt, V., **Kawamura, S.**, Numata, K., Miyakawa, O., Sato, S., **Nishizawa, A.**, **Yamazaki, T.**, **Fukushima, M.**, Furusawa, A., Sugamoto, A.: 2008, A study for suppression of radiation pressure noise using ponderomotive squeezing in gravitational wave detectors, *JPhCS*, **122**, 12020.

Sasada, M., Uemura, M., Arai, A., Fukazawa, Y., Kawabata, K. S., Ohsugi, T., **Yamashita, T.**, **Isogai, M.**, Sato, S., **Kino, M.**: 2009, Detection of Polarimetric Variations Associated with the Shortest Time-Scale Variability in S5 0716+714, *PASJ*, **60**, L37-L41.

Sato, B., **Izumiura, H.**, Toyota, E., **Kambe, E.**, Ikoma, M., Omiya, M., Masuda, S., **Takeda, Y.**, Murata, D., Itoh, Y., **Ando, H.**, **Yoshida, M.**, **Kokubo, E.**, Ida, S.: 2008, Planetary Companions around Three Intermediate-Mass G and K Giants: 18 Delphini, ξ Aquilae, and HD 81688, *PASJ*, **60**, 539-550.

Sato, B., Toyota, E., Omiya, M., **Izumiura, H.**, **Kambe, E.**, Masuda, S., **Takeda, Y.**, Itoh, Y., **Ando, H.**, **Yoshida, M.**, **Kokubo, E.**, Ida, S.: 2008, Planetary Companions to Evolved Intermediate-Mass Stars: 14 Andromedae, 81 Ceti, 6 Lyncis, and HD167042 , *PASJ*, **60**, 1317-1326.

Sato, K., Tsuchiya, A., **Oshima, T.**, Yamasaki, N. Y., Morooka, T.: 2008, Development of Low Temperature SQUID Gradiometer Array for Metallic Magnetic Microcalorimeters, *JLTP*, **151**, 345-350.

Sato, M., et al. including **Bushimata, T.**, **Choi, Y. K.**, **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kim, M. K.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**: 2008, Distance to NGC281 in aGalactic Fragmenting Superbubble: Parallax Measurements with VERA, *PASJ*, **60**, 975-987.

Sato, S., **Kawamura, S.**: 2008, Alignment signal extraction of the optically degenerate RSE interferometer using the wave front sensing technique, *JPhCS*, **122**, 12025.

Sato, S., **Kokeyama, K.**, **Kawamura, S.**, Ward, R. L., **Nishizawa, A.**, Chen, Y., Pai, A., Somiya, K.: 2008, Displacement noise free interferometory for gravitational wave detection, *JPhCS*, **120**, 32006.

Sato, S., **Kokeyama, K.**, **Kawamura, S.**, Ward, R. L., **Nishizawa, A.**, Chen, Y., Pai, A., Somiya, K.: 2008, Demonstration of displacement-noise-free interferometry using bi-directional Mach–Zehnder interferometers, *CQGra*, **25**, 114031.

Sato, Y., **Tamura, M.**, **Kandori, R.**, **Nakajima, Y.**, **Kusakabe, N.**, **Hashimoto, J.**, **Kudo, T.**, **Saito, H.**, Kitamura, Y., Kawamura, A., Nishiyama, S., **Sunada, K.**, Ueno, M.: 2008, Identification of the Exciting Source of CO Outflow in the Star-Formation Region GGD 12-15, *PASJ*, **60**, S429-S433.

Satou, N., **Sekimoto, Y.**, **Iizuka, Y.**, **Ito, T.**, Shan, W. L., Kamba, T., **Kumagai, K.**, **Kamikura, M.**, Tomimura, Y., **Serizawa, Y.**, **Asayama, S.**, **Sugimoto, M.**: 2008, A Submillimeter Cartridge-Type Receiver: ALMA Band 8 (385–500 GHz) qualification model, *PASJ*, **60**, 1199-1207.

Sawada, T., et al. including **Sunada, K.**, **Kuno, N.**, **Kamazaki, T.**, **Morita, K.-I.**, **Kurono, Y.**: 2008, On-The-Fly Observing System of the Nobeyama 45-m and ASTE 10-m Telescopes, *PASJ*, **60**, 445-455.

Sawada-Satoh, S., Kameno, S., Nakamura, K., Namikawa, D., **Shibata, K. M.**, **Inoue, M.**: 2008, Positional Coincidence of H_2O Maser and a Plasma-Obscuring Torus in Radio Galaxy NGC 1052, *ApJ*, **680**, 191-199.

Seok, J. Y., et al. including **Ita, Y.**: 2008, Supernova Remnants in the AKARI IRC Survey of the Large Magellanic Cloud, *PASJ*, **60**, 453.

Serizawa, Y., **Sekimoto, Y.**, **Kamikura, M.**, Shan, W. L., **Ito, T.**: 2008, A 400–500 GHz Balanced SIS Mixer with a Waveguide Quadrature Hybrid Coupler, *IJIMW*, **29**, 846-861.

Seto, N., Taruya, A.: 2008, Polarization analysis of gravitational-wave backgrounds from the correlation signals of ground-based interferometers: Measuring a circular-polarization mode, *PhRvD*, **77**, 103001.

Seto, N.: 2008, Detecting Planets around Compact Binaries with Gravitational Wave Detectors in Space, *ApJL*, **677**, 55.

Seto, N.: 2008, Non-Gaussianity Test for Discriminating Gravitational Wave Backgrounds around 0.1-1 Hz, *ApJL*, **683**, 95.

Shapiro, K. L., et al. including **Arimoto, N.**: 2008, Kinemetry of SINS High-Redshift Star-Forming Galaxies: Distinguishing Rotating Disks from Major Mergers, *ApJ*, **682**, 231-251.

Shimajiri, Y., Takahashi, S., Takakuwa, S., **Saito, M.**, **Kawabe, R.**: 2008, Millimeter- and Submillimeter-Wave Observations of the OMC-2/3 Region. II. Observational Evidence for Outflow-Triggered Star Formation in the OMC-2 FIR 3/4 Region, *ApJ*, **683**, 255-266.

Shimizu, M., Nishida, K., Takasaki, H., Shiota, D., **Magara, T.**, Shibata, K.: 2008, The Correlation among the Rise Velocity of a Soft X-Ray Loop, the Ejection Velocity of a Plasmoid, and the Height above the Loop Top of the Hard X-Ray Source in Masuda-Type Flares, and Its Interpretation Based on the Reconnection Model of Flares, *ApJL*, **683**, L203.

Shimizu, T., et al. including **Tsuneta, S.**, **Suematsu, Y.**: 2008, Image Stabilization System for Hinode (Solar-B) Solar Optical Telescope, *SoPh*, **249**, 221.

Shimizu, T., Lites, B. W., **Katsukawa, Y.**, Ichimoto, K., **Suematsu, Y.**, **Tsuneta, S.**, Nagata, S., Kubo, M., Shine, R. A., Tarbell, T. D.: 2008, Frequent Occurrence of High-speed Local Mass Downflows on the Solar Surface, *ApJ*, **680**, 1467.

Shimonishi, T., Onaka, T., Kato, D., Sakon, I., **Ita, Y.**, Kawamura A., Kaneda, H.: 2008, AKARI Near-Infrared Spectroscopy: Detection of H_2O and CO_2 Ices toward Young Stellar Objects in the Large Magellanic Cloud, *ApJ*, **686**, L99.

Shin, J., **Sakurai, T.**: 2009, Optical Characteristics of the Soft X-Ray Telescope Aboard Yohkoh. I. Interpretation of the Undersampled Point Spread Function, *SoPh*, **254**, 357-384.

Shinnaga, H., Phillips, T. G., **Furuya, R. S.**, Cesaroni, R.: 2008, Submillimeter Observations of the Isolated Massive Dense Clump IRAS 20126+4104, *ApJ*, **682**, 1103-1113.

Shintani, M., et al. including **Hirota, T.**, **Kijima, M.**, **Kobayashi, H.**, **Matsumoto, N.**, **Miyaji, T.**, **Oyama, T.**, **Yamashita, K.**: 2008, Statistical Properties of Stellar H_2O Masers – Results of Three-Year Single-Dish Observations with the VERA Iriki Telescope, *PASJ*, **60**, 1077-1131.

Shirai, K., Okada, T., Yamamoto, Y., **Arai, T.**, Ogawa, K., Shiraishi, H., Iwasaki, M., Arakawa, M., Grande, M., Kato, M.: 2008, Instrumentation and performance evaluation of the XRS on SELENE orbiter, *EP&S*, **60**, 277-281.

Shirasaki, Y., et al. including **Tanaka, M.**, **Kawanomoto, S.**, **Honda, S.**, **Ohishi, M.**, **Mizumoto, Y.**, **Masunaga, Y.**: 2008, Data processing for ‘SUBARU’ telescope using GRID, F*usion Engineering and Design*, **83**, 438-441.

Shizuma, T., **Hayakawa, T.**, Ohgaki, H., Toyokawa, H., Komatsubara, T., Kikuzawa, N., Tamii, A., Nakada, H.: 2008, Fine structure of the magnetic-dipole-strength distribution in 208Pb, *PhRC*, **78**, 061303®.

Shizuma, T., Ishii T., Makii, H., **Hayakawa, T.**, Matsuda, M.: 2009, A 3-quasiparticle isomer in neutron-rich 183Ta, *EPJA*, **39**, 263-266.

Shizuma, T., Ishii, T., Makii, H., **Hayakawa, T.**, Matsuda, M., Shigematsu, S., Ideguchi, E., Zheng, Y., Liu, M., Morikawa, T., Oi, M.: 2008, One-quasiparticle bands in neutron-rich 187W, *PhRC*, **77**, 47303.

Stonkute, R., Vansevicius, V., **Arimoto, N.**, Hasegawa, T., Narbutis, D., **Tamura, N.**, Jablonka, P., Ohta, K., **Yamada, Y.**: 2008, An Extended Star Cluster at the Outer Edge of the Spiral Galaxy M33, *AJ*, **135**, 1482-1487.

Suematsu, Y., et al. including **Tsuneta, S.**, **Katsukawa, Y.**, **Nakagiri, M.**, **Noguchi, M.**, **Tamura, T.**, **Kato, Y.**, **Hara, H.**, **Kubo, M.**: 2008, The Solar Optical Telescope of Solar-B (*Hinode*): The Optical Telescope Assembly, *SoPh*, **249**, 197-220.

Sugiyama, K., Odaka, M., Nakajima, K., Hayashi, Y.-Y.: 2008, Development of a Cloud Convection Model to Investigate the Jupiter's Atmosphere, Nagare Multimedia, http://www.nagare.or.jp/mm/2008/sugiyama/ (online journal).

Sugiyama, K., Fujisawa, K., Doi, A., **Honma, M.**, Isono, Y., **Kobayashi, H.**, Mochizuki, N., Murata, Y.: 2008, A Synchronized Variation of the 6.7GHz Methanol Maser in Cepheus A, *PASJ*, **60**, 1001-1006.

Suwa, Y., Takiwaki, T., **Kotake, K.**, Sato, K.: 2009, Impact of

Rotation on Neutrino Emission and Relic Neutrino Background from Population III Stars, *ApJ*, **690**, 913-922.

Suzuki, R., Tokoku, C., Ichikawa, T., Uchimoto, Y. K., Konishi, M., Yoshikawa, T., **Tanaka, I.**, Yamada, T., **Omata, K.**, **Nishimura, T.**: 2008, Multi-Object Infrared Camera and Spectrograph (MOIRCS) for the Subaru Telescope I. Imaging, *PASJ*, **60**, 1347-1362.

Suzuki, T., Kaneda, H., Matsuura, S., Shirahata, M., Nakagawa, T., Doi, Y., Onaka, T., **Hibi, Y.**, Kawada, M., Shibai H.: 2008, Radiation Effects on Stressed Ge:Ga Array Detector of Far-Infrared Surveyor on AKARI, *PASP*, **120**, 895-906.

Swinyard, B., et al. including **Arimoto, N.**, **Furusho, R.**, **Hayashi, M.**, **Imanishi, M.**, **Izumiura, H.**, **Kodama, T.**, **Kokubo, E.**, **Omukai, K.**, **Nakajima, T.**, **Saito, H.**, **Sato, Y.**, **Pyo, T.-S.**, **Tamura, M.**, **Watanabe, J.**: 2009, The space infrared telescope for cosmology and astrophysics: SPICA A joint mission between JAXA and ESA, *ExA*, **23**, 193-219.

Takahashi, K., Ichiki, K., **Sugiyama, N.**: 2008, Electromagnetic properties of the early universe, *PhRvD*, **77**, 124028.

Takahashi, R., et al. including **Arai, K.**, **Tatsumi, D.**, **Fukushima, M.**, **Yamazaki, T.**, **Fujimoto, M. K.**: 2008, Operational status of TAMA300 with the Seismic Attenuation System (SAS), *CQGra*, **25**, 114036.

Takahashi, R., et al. including **Sugiyama, N.**: 2008, Simulations of baryon acoustic oscillations - I. Growth of large-scale density fluctuations, *MNRAS*, **389**, 1675-1682.

Takahashi, S., **Saito, M.**, Ohashi, N., **Kusakabe, N.**, Takakuwa, S., **Shimajiri, Y.**, **Tamura, M.**, **Kawabe, R.**: 2008, Millimeter- and Submillimeter-Wave Observations of the OMC-2/3 Region. III. An Extensive Survey for Molecular Outflows, *ApJ*, **688**, 344-361.

Takato, N.: 2008, Rotation-Resolved Spectroscopy of a Very Young Asteroid, (1270) Datura, *ApJ*, **685**, L161-L163.

Takechi, S., et al. including **Sasaki, S.**: 2008, Investigation on piezoelectric lead zirconate titanate detector bombarded obliquely with hypervelocity iron particles, *P&SS*, **56**, 1309-1313.

Takechi, S., et al. including **Sasaki, S.**: 2008, Response of piezoelectric lead zirconate titanate detector to oblique impact with hypervelocity iron particles, *EP&S*, **60**, 1187-1190.

Takechi, S., et al. including **Sasaki, S.**: 2008, Measurement of incident position of hypervelocity particles on piezoelectric lead zirconate titanate detector, *RScI*, **79**, 043303.

Takechi, S., et al. including **Sasaki, S.**: 2009, Laboratory calibration measurements of a piezoelectric lead zirconate titanate cosmic dust detector at low velocities, *AdSpR*, **43**, 905-909.

Takeda, Y., Han, I., Kang, D.-I., Lee, B.-C., Kim, K.-M.: 2008, Rotation and Surface Abundance Peculiarities in A-Type Stars, *JKAS*, **41**, 83-98.

Takeda, Y., **Kawanomoto, S.**, **Ohishi, N.**: 2008, Rotational Feature of Vega Revealed from Spectral Line Profiles, *ApJ*, **678**, 446-462.

Takeda, Y., Sato, B., Murata, D.: 2008, Stellar Parameters and Elemental Abundances of Late-G Giants, *PASJ*, **60**, 781-802.

Takeda, Y.: 2008, Abundances of lithium, sodium and potassium in Vega, *MNRAS*, **388**, 913-920.

Takiwaki T., **Kotake, K.**, Sato, K.: 2009, Special Relativistic Simulations of Magnetically-dominated Jets in Collapsing Massive Stars, *ApJ*, **691**, 1360-1379.

Tanabq, T., et al. including **Ita, Y.**: 2008, Absolute Photometric Calibration of the Infrared Camera (IRC) aboard AKARI, *PASJ*, **60**, 375.

Tanaka, M., et al. including **Yoshida, M.**: 2009, Supernova 2008D associated with the Luminous X-ray Transient 080109: An Energetic Explosion of a Massive Helium Star, *ApJ*, **692**, 1131-1142.

Tanaka, M., Finoguenov, A., **Kodama, T.**, **Morokuma, T.**, Rosati, P., Stanford, S. A., Eisenhardt, P., Holden, B., Mei, S.: 2008, The environmental dependence of properties of galaxies around the RDCSJ0910+54 cluster at z=1.1, *A&A*, **489**, 571-581.

Tanaka, M., Kawabata, K. S., Maeda, K., **Hattori, T.**, Nomoto, K.: 2008, Optical Spectropolarimetry and Asphericity of the Type Ic SN 2007gr, *ApJ*, **689**, 1191-1198.

Tashiro, H., Silk, J., Langer, M., **Sugiyama, N.**: 2009, The Sunyaev-Zel'dovich effect and Faraday rotation contributions of galaxy groups to the CMB angular power spectrum, *MNRAS*, **392**, 1421-1428.

Tashiro, H., **Sugiyama, N.**: 2008, Constraints on primordial black holes by distortions of the cosmic microwave background, *PhRvD*, **78**, 23004.

Tatematsu, K., **Kandori, R.**, **Umemoto, T.**, **Sekimoto, Y.**: 2008, N_2H^+ and HC_3N Observations of the Orion A Cloud, *PASJ*, **60**, 407-419.

Tatsumi, D.: 2008, TAMA300 interferometer development, *JPhCS*, **120**, 32011.

Tavrov, A. V., **Nishikawa, J.**, **Tamura, M.**, Abe, L., Yokochi, K., Kurokawa, T., Takeda, M.: 2008, Achromatic interfero-coronagraph with two common-path interferometers in tandem, *ApOpt*, **47**, 4915-4926.

Tokuno, H., et al. including **Mizumoto, Y.**, **Shirasaki, Y.**: 2008, The cosmic ray primary composition at the knee region from lateral distributions of atmospheric Cerenkov photons in extensive air showers, *APh*, **29**, 453-460.

Tokutani, M., Yoshida, N., Oh, P. S., **Sugiyama, N.**: 2009, The 21-cm signature of early relic HII regions, *MNRAS*, **395**, 777-780.

Totani, T., **Morokuma, T.**, Oda, T., Doi, M., Yasuda, N.: 2008, Delay Time Distribution Measurement of Type Ia Supernovae by the Subaru/XMM-Newton Deep Survey and Implications for the Progenitor, *PASJ*, **60**, 1327-1346.

Toth, G., et al. including **Goossens, S.**: 2009, IAG Newsletter, *J. Geod.*, **83**, 87-90.

Tsap, Y. T., Kopylova, Y. G., Stepanov, A. V., Melnikov, V. F., **Shibasaki, K.**: 2008, Ballooning Instability in Coronal Flare Loops, *SoPh*, **253**, 161-172.

Tsuboi, M., et al. including **Tosaki, T.**, **Kuno, N.**, **Nakanishi, K.**, **Sawada, T.**, **Umemoto, T.**, **Kurono, Y.**, **Tsukagoshi, T.**, **Kameya, O.**, **Kobayashi, H.**: 2008, The 2006 Radio Outburst of a Microquasar Cyg X-3: Observation and Data, *PASJ*, **60**, 465-473.

Tsuboi, M., **Miyazaki, A.**, Okumura, S. K.: 2009, A Galactic Center 50-km s-1 Molecular Cloud with an Expanding Shell, *PASJ*, **61**, 29-37.

Tsuneta, S., et al. including **Katsukawa, Y.**, **Shimojo, M.**, **Suematsu, Y.**: 2008, Magnetic Landscape of Sun's Polar Region, *ApJ*, **688**, 1374-1381.

Tsuneta, S., et al. including **Katsukawa, Y.**, **Suematsu, Y.**: 2008, The Solar Optical Telescope (SOT) for the Solar-B Mission, *SoPh*, **249**, 167.

Uchimoto, Y. K., et al. including **Suzuki, R.**, **Omata, K.**, **Nishimura, T.**, **Tanaka, I.**: 2008, Subaru/MOIRCS Near-Infrared Imaging in the Proto-Cluster Region at z=3.1, *PASJ*, **60**, 683-693.

Ueda, H., **Nagashima, M.**, Yahagi, H.: 2008, Analysis of the Spatial Distribution of Galaxies in the Numerical Galaxy Catalog, *PASJ*, **61**, 85.

Ueda, K., Imai, H., **Deguchi, S.**, **Kamohara, R.**, Maeda, T., **Matsumoto, N.**, Omodaka, T.: 2008, Japanese VLBI Network Observations of SiO Masers in the M-Type Giant IRC -10414, *PASJ*, **60**, 1051-1056.

Ueda, Y., et al. including **Sekiguchi, K.**: 2008, The Subaru/XMM-Newton Deep Survey (SXDS). III. X-Ray Data, *ApJS*, **179**, 124-141.

Uehara, T., Sato, A., Maehara, S., Nimonji, T., Sato, T., Ohkawa, M, Maruyama, T., **Kawamura, S.**: 2009, Comparison of three semiconductor laser systems for gravitational wave detection, *OptEn*, **48**, 34302.

Uemura, M., et al. including **Yamashita, T.**: 2008, Discovery of a WZ Sge-Type Dwarf Nova, SDSS J102146.44+234926.3: Unprecedented Infrared Activity during a Rebrightening Phase, *PASJ*, **60**, 227-236.

Ueta, T., **Izumiura, H.**, Yamamura, I., Nakada, Y., **Matsuura, M.**, **Ita, Y.**, Tanabe, T., Fukushi, H., Matsunaga, N., Mito, H.: 2008, AKARI/FIS Mapping of the ISM-Wind Bow Shock around α Orionis, *PASJ*, **60**, S407-S413.

Ujino, H., Vinet, L., Yajima, T., **Yoshida, H.**: 2008, Additional constants of motion for a discretization of the Calogero- Moser model, *JPSJ*, **77**, 74001.

Vargas Dominguez, S., Rouppe van der Voort, L., Bonet, J. A., Martinez Pillet, V., Van Noort, M., **Katsukawa, Y.**: 2008, Moat Flow in the Vicinity of Sunspots for Various Penumbral Configurations, *ApJ*, **679**, 900.

Wada, K.: 2008, Instabilities of Spiral Shocks. II. A Quasi-Steady State in the Multiphase Inhomogeneous ISM, *ApJ*, **675**, 188.

Warren, H. P., Winebarger, A. R., Mariska, J. T., Doschek, G. A., **Hara, H.**: 2008, Observation and Modeling of Coronal "Moss" With the EUV Imaging Spectrometer on *Hinode*, *ApJ*, **677**, 1395.

Watabe, Y., **Kawakatu, N.**, **Imanishi, M.**: 2008, Nuclear/Circumnuclear Starbursts and Active Galactic Nucleus Mass Accretion in Seyfert Galaxies, *ApJ*, **677**, 895-905.

Watanabe, H., Kitai, R., Ichimoto, K., **Katsukawa, Y.**: 2009, Magnetic Structure of Umbral Dots Observed with the *Hinode* Solar Optical Telescope, *PASJ*, **61**, 193.

Watanabe, T., **Hara, H.**, Yamamoto, N., Kato, D., Sakaue, H. A., Murakami, I., Kato, T., Nakamura, N., Young, P. R.: 2009, Fe XIII Density Diagnostics in the EIS Observing Wavelengths, *ApJ*, **692**, 1294.

Whitney, B. A., et al. including **Mizuno, N.**: 2008, Spitzer Sage Survey of the Large Magellanic Cloud. III. Star Formation and ~1000 New Candidate Young Stellar Objects, *AJ*, **136**, 18-43.

Wilson, C. D., et al. including **Iono, D.**: 2008, Luminous Infrared Galaxies with the Submillimeter Array: I. Survey Overview and the Central Gas to Dust Ratio, *ApJS*, **178**, 189-224.

Wilson, G. W., et al. including **Ezawa, H.**, **Kawabe, R.**, **Kuboi, A.**, **Matsuo, H.**, **Murakoshi, Y.**, **Oshima, T.**, **Tanaka, K.**, **Yamaguchi, N.**: 2008, A Bright, Dust-Obscure, Millimeter-Selected Galaxy Beyond the Bullet Cluster (1E0657-56), *MNRAS*, **390**, 1061-1070.

Winn, J. N., Johnson, J. A., **Narita, N.**, Suto, Y., Turner, E. L., Fischer, D. A., Butler, R. P., Vogt, S. S., O'Donovan, F. T., Gaudi, B. S.: 2008, The Prograde Orbit of Exoplanet TrES-2b, *ApJ*, **682**, 1283-1288.

Yabe, K., Ohta, K., **Iwata, I.**, Sawicki, M., **Tamura, N.**, Akiyama, M., **Aoki, K.**: 2009, The Stellar Populations of Lyman Break Galaxies at z~5, *ApJ*, **693**, 507.

Yamamoto, H., et al. including **Mizuno, N.**: 2008, Aligned Molecular Clouds towards SS 433 and L = 348°.5: Possible Evidence for a Galactic "Vapor Trail" Created by a Relativistic Jet, *PASJ*, **60**, 715-729.

Yamamoto, K., et al. including **Tatsumi, D.**: 2008, Current status of the CLIO project, *JPhCS*, **122**, 12002.

Yamamoto, K., Hayakawa, H., Okada, A., Uchiyama, T., Miyoki, S., Ohashi, M., Kuroda, K., Kanda, N., **Tatsumi, D.**, Tsunesada, Y.: 2008, Effect of energy deposited by cosmic-ray particles on interferometric gravitational wave detectors, *PhRvD*, **78**, 22004.

Yamamoto, N., Kinoshita, D., **Fuse, T.**, **Watanabe, J.**, Kawabata, K.: 2008, A Deep Sky Survey of Edgeworth Kuiper Belt Objects with an Improved Shift-and-Add Method, *PASJ*, **60**, 285-291.

Yamamoto, T. T., **Sakurai, T.**: 2009, Correlations between Flare Parameters and Magnetic Parameters in Solar Flares, *PASJ*, **61**, 75-84.

Yamamoto, Y., Okada, T., Shiraishi, H., Shirai, K., **Arai, T.**, Ogawa, K., Hosono, K., Arakawa, M., Kato, M.: 2008, Current status of X-ray spectrometer development in the SELENE project, *AdSpR*, **42**, 305-309.

Yamauchi, C., **Yagi, M.**, **Goto, T.**: 2008, E+A and Companion Galaxies - I : A Catalogue and Statistics, *MNRAS*, **390**, 383.

Yamazaki, D. G., Ichiki, K., **Kajino, T.**, Mathews, G. J.: 2008, Effects of a primordial magnetic field on low and high multipoles of the cosmic microwave background, *PhRvD*, **77**, 43005.

Yamazaki, D. G., **Kajino, T.**, Ichiki, K., Mathews, G. J.: 2008, Constraints on the Primordial Magnetic Field from σ_8, *PhRvD*, **78**, 1123001.

Yan, J., Li, F., Ping, J., **Goossens, S.**: 2009, Lunar gravity field recovery based on LP Doppler data, Cehui Xuebao/Acta Geodaetica et Cartographica *Sinica*, **38**, 6-11.

Yan, J., Ping, J., **Matsumoto, K.**, Li, F.: 2008, The Simulation of lunar gravity field recovery from D-VLBI of Chang'E-1 and SELENE lunar orbiters, *AdSpR*, **42**, 337-340.

Yasutake, N., Kashiwa, K.: 2009, Lepton effects on the proto-neutron stars with the hadron-quark mixed phase in the Nambu-Jona-Lasinio model, *PhRvD*, **79**, 43012.

Yasutake, N., Noda, T., Yamada, S., Hashimoto, M. **Kotake, K.**: 2008, Effects of QCD Phase Pransition on Ejected Elements from the Envelopes of Compact Stars, *Physics of Self- Organization Systems*, **1**, 219.

Yoshida, F., Nakamura, T.: 2008, A Comparative Study of Size Distributions for Small L4 and L5 Jovian Trojans, *PASJ*, **60**, 297-301.

Yoshida, M., Shimasaku, K., Ouchi, M., **Sekiguchi, K.**, **Furusawa,**

H., Okamura, S.: 2008, The Subaru/XMM-Newton Deep Survey (SXDS). VII. Clustering Segregation with Ultraviolet and Optical Luminosities of Lyman Break Galaxies at $z \sim 3$, *ApJ*, **679**, 269-278.

Yoshida, M., **Yagi, M.**, **Komiyama, Y.**, **Furusawa, H.**, **Kashikawa, N.**, Koyama, Y., **Yamanoi, H.**, **Hattori, T.**, Okamura, S.: 2008, Strange Filamentary Structures ("Fireballs") around a Merger Galaxy in the Coma Cluster of Galaxies, *ApJ*, **688**, 918-930.

Yoshida, N., **Omukai, K.**, Hernquist, L.: 2008, Protostar Formation in the Early Universe, *Science*, **321**, 669-671.

Yoshida, T., Suzuki, T., Chiba, S., **Kajino, T.**, Yokomakura, H., Kimura, K., Takamura, A., Hartmann, D. H.: 2008, Neutrino-Nucleus Reaction Cross Sections for Light Element Synthesis in Supernova Explosions, *ApJ*, **686**, 448-466.

Young, P. R., **Watanabe, T.**, **Hara, H.**, Mariska, J. T.: 2009, High-precision density measurements in the solar corona - I. Analysis methods and results for Fe XII and Fe XIII, *A&A*, **495**, 587.

Younger, J. D., et al. including **Iono, D.**: 2008, Clarifying the Nature of the Brightest Submillimeter Sources: Interferometric Imaging of LH850.02, *MNRAS*, **387**, 707-712.

Younger, J. D., et al. including **Iono, D.**: 2008, The Physical Scale of the Far-Infrared Emission in the Most Luminous Submillimeter Galaxies, *ApJ*, **688**, 59-66.

2. Publications of the National Astronomical Observatory of Japan

Ukita, N., **Ikenoue, B.**, **Saito, M.**: 2008, Optical Seeing Measurements with an Optical Telescope on a Radio Antenna, *Publ. Nat. Astron. Obs. Japan*, **11**, 1-12.

Sôma, M.: 2008, List of Lunar Eclipses between 1500 BC and 1000 BC, *Publ. Nat. Astron. Obs. Japan*, **11**, 13-35.

3. Report of the National Astronomical Observatory of Japan (in Japanese)

Ishizaki, H.: 2008, Frequency Characteristics of Atmospheric Turbulent Flow in the Troposphere and Disturbance of Boundary under the Ionosphere Observed with the Radio Seeing Monitors. —To Realize Phase Compensation of the ALMA Observations, *Rep. Nat. Astron. Obs. Japan*, **11**, 15-30.

Sekiguchi, H., **Kawashima, S.**, **Shinohara, N.**, **Houjyou, M.**: 2008, Trouble Database and Availability of Nobeyama Radioheliograph System, *Rep. Nat. Astron. Obs. Japan*, **11**, 1-13.

Katayama, M., **Matsuda, K.**, **Fukushima, T.**, **Watanabe, J.-I.**: 2008, Revising Plan of "Calendar and Ephemeris", *Rep. Nat. Astron. Obs. Japan*, **11**, 57-67.

Tanikawa, K., **Sôma, M.**: 2008, Japanese Astronomy in the Seventh Century, *Rep. Nat. Astron. Obs. Japan*, **11**, 31-55.

4. Conference Proceedings

Abe, L., Venet, M., Enya, K., Kataza, H., Nakagawa, T., **Tamura, M.**: 2008, Multi-stage apodized pupil Lyot coronagraph experimental results, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 701467-1-11.

Abe, M., et al. including **Takato, N.**, **Fujiyoshi, T.**, Terada, H.: 2008, Ground-based Observational Campaign for 162173 1999JU3, the Target Asteroid of Sample Return Mission, Hayabusa-2, Asteroids, Comets, Meteors 2008.

Abe, M., et al. including **Takato, N.**, **Fujiyoshi, T.**, **Terada, H.**: 2008, Ground-based observational campaign for asteroid 162173 1999 JU3, 37th COSPAR Scientific Assembly, B04-0061-08, 12.

Abe, M., et al. including **Takato, N.**, **Fujiyoshi, T.**, **Terada, H.**: 2008, Ground-based Observational Campaign for Asteroid 162173 1999 JU3, 39th Lunar and Planetary Science Conf.

Abramov-Maximov, V. E., Gelfreikh, G. B., Kobanov, N. I., **Shibasaki, K.**: 2009, A comparison of parameters of 3-minute and 5-minute oscillations in sunspots from synchronous microwave and optical observations, Proc. of the IAU Symp. 257, Eds. N. Gopalswamy, D. F. Webb, 95-99.

Adams, M., Boffin, H. J., Garnier, W., **Iono, D.**: 2008, The Global ALMA EPO Programme: Communicating Astronomy with the Public at Millimetre and Submillimetre Wavelengths,, Proc. of the IAU/NOA/ESA/ESO Conf., Eds. L. L. Christensen, M. Zoulias, I. Robson, 288-293.

Agata, H.: 2008, Science as a Culture, and an Introduction to new PUR experiments in Japan, Global Hands-On Universe 2007, Eds. T. Handa, M. Okyudo, 119-121.

Akitaya, H., et al. including **Iye, M.**, **Okita, K.**, **Sato, N.**, **Matsuo, H.**, **Yamashita, T.**: 2008, Application of zero-expansion pore-free ceramics to a mirror of an astronomical telescope, SPIE 7018, 70183H.

Akiyama, M., **Minowa, Y.**, Kobayashi, N., Ohta, K., **Iwata, I.**: 2008, Adaptive Optics Rest-frame V-band Imaging of Galaxies at z~3: High Surface Density Disk-Like Galaxies?, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 247.

Akiyama, M., **Minowa, Y.**, Kobayashi, N., Ohta, K., **Iwata, I.**: 2008, Adaptive optics imaging of Lyman break galaxies as progenitors of spheroids in the local Universe, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 447.

Akiyama, M., Smedley, S., Gillingham, P., Brzeski, J., Farrell, T., **Kimura, M.**, Muller, R., **Tamura, N.**, **Takato, N.**: 2008, Performance of Echidna fiber positioner for FMOS on Subaru, SPIE 7018.

Antolin, P., Shibata, K., **Kudoh, T.**, Shiota, D., Brooks, D.: 2008, Predicting observational signatures of coronal heating by Alfvén waves and nanoflares, Proc. of the IAU Symp. 247, Eds. R. Erdelyi, C. A. Mendoza-Briceno, 279.

Aoki, K., Totani, T., **Hattori, T.**, Ohta, K., Kawabata, K. S., Kobayashi, N., **Iye, M.**, Nomoto, K., Kawai, N.: 2008, No Evidence for Variability of Intervening Absorption Lines toward GRB 060206: Implications for the Mg II Incidence Problem, arXiv0808:4157.

Aoki, W., Barklem, P., Beers, T. C., Christlieb, N., Inoue, S.: 2008, Lithium Abundances in Extremely Metal-Poor Turn-Off Stars, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 37-42.

Arlot, J.-E., et al. including **Sôma, M.**: 2008, Division I-III/ Working Group Natural Planetary Satellites, Trans. IAU 27A, Ed. K. van der Hucht, 69-71.

Asada, K., **Inoue, M.**, Nakamura, M., Kameno, S., **Nagai, H.**: 2008, Rotation Measure Observation towards NRAO 140 Jet: Constraints for the Pitch Angle of a Helical Magnetic Field, Extragalactic Jets: Theory and Observation from Radio to Gamma Ray (ASP Conf. Ser. 386), Eds. T. A. Rector, D. S. De Young, 513.

Asayama, S., **Kawashima, S.**, **Iwashita, H.**, **Takahashi, T.**, **Inata, M.**, **Obuchi, Y.**, **Suzuki, T.**, **Wada, T.**: 2008, Design and Development of ALMA Band 4 Cartridge Receiver, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 244-249.

Bakunina, I. A., Abramov-Maximov, V. E., Lesovoy, S. V., **Shibasaki, K.**, Solov'ev, A. A., Tikhomirov, Y. V.: 2009, Long period oscillations of microwave emission of solar active regions: observations with NoRH and SSRT, Proc. of the IAU Symp. 257, Eds. N. Gopalswamy, D. F. Webb, 155-157.

Beltrán, M. T., Cesaroni, R., Moscadelli, L., Testi, L., Codella, C., **Furuya, R. S.**, Goddi, C.: 2008, Infall and the Formation of a Massive Star, Massive Star Formation: Observations Confront Theory (ASP Conf. Ser. 387), Eds. H. Beuther, H. Linz, T. Henning, 71 -77.

Bone, L. A., Culhane, J. L., van Driel-Gesztelyi, L., **Hara, H.**: 2008, Long Duration Thermal Hard X-ray Sources Observed in Two Eruptive Flares, First Results from Hinode (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 160.

Bowell, E. L. G., et al. including **Watanabe, J.**: 2008, Division III: Planetary Systems Sciences, Trans. IAU 27A, Ed. K. van der Hucht, 149-153.

Bukovski, M. A., et al. including **Shitov, S.**, **Kojima, T.**, **Kroug, M.**, **Noguchi, T.**, **Uzawa, Y.**: 2008, SIS Mixers for ALMA Band-10: Comparison of Epitaxial and Hybrid Circuits, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 540-543.

Burningham, Ben, Pinfield, D. J., Leggett, S. K., **Tamura, M.**, Lucas, P. W., Homeier, D.: 2009, T dwarfs all the way to 550 K?, AIP Conf. Proc. 1094, 184-189.

Candotti, M., **Uzawa, Y.**, **Shitov, S. V.**, **Fujii, Y.**, **Kaneko, K.**: 2008, ALMA and 10b ptics toolerance analysis, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 521-527.

Chiba, M., Minezaki, T., Inoue, K. T., **Kashikawa, N.**, Kataza, H., Sugai, H.: 2008, Dark Matter Substructure in Lensing Galaxies, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 98.

Chiba, S., et al. including **Kajino, T.**: 2008, The *r*-process element abundance with a realistic fission fragment mass distribution, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 162-267.

Choi, Y. K., **Hirota, T.**, **Honma, M.**, **Kobayashi, H.**: 2008, Astrometry of red supergiant VY Canis Majoris with VERA, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 192-193.

Culhane, J. L., **Hara, H.**, **Watanabe, T.**, Matsuzaki, K., Harra, L. K., Cargill, P., Mariska, J. T., Doschek, G. A.: 2008, Long Duration Flare Observed with Hinode EIS, First Results from Hinode (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 121.

Dalton, G. B., et al. including **Tamura, N.**, **Takato, N.**: 2008, Integration, commissioning, and performance of the UK FMOS spectrograph, SPIE 7014, Eds. I. S. McLean, M. M. Casali.

de La Luz, V., Lara, A., Mendoza, E., **Shimojo, M.**: 2008, 3D Simulations of the Quiet Sun Radio Emission at Millimeter and Submillimeter Wavelengths, Geofísica Internacional, 47, 197-203.

Deguchi, S., Matsunaga, N., Fukushi, H., Kaminski, T.: 2009, Detection of the SiO J=2–1, v=1 Maser Emission at 86.2 GHz in V838 Mon, an Unusual Nova-Like Variable, The Astronomer's Telegram, Eds. R. E. Rutledge, D. Fox, #1996.

Deguchi, S.: 2009, Study of Red Supergiants in Embedded Star Clusters by Radio Lines, AGB Stars and Related Phenomena, Eds. T. Ueta, N. Matsunaga, Y. Ita, 74.

Doherty, M., **Kodama, T.**, Seymour, N., Tanaka, M., Vernet, J., De Breuck, C., Kurk, J.: 2008, Massive Galaxies in High Redshift Proto-Clusters, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 368-370.

Doi, M., et al. including **Morokuma, T.**, **Furusawa, H.**, **Nakaya, H.**, **Komiyama, Y.**, **Yagi, M.**, **Okada, N.**: 2008, First light of UT 15-band dichroic-mirror camera, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70140F.

Doi, M., et al. including **Morokuma, T.**, **Furusawa, H.**, **Komiyama, Y.**, **Yagi, M.**, **Yamashita, T.**: 2008, Instruments with Many Dichroic Mirrors and CCDs, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 491-492.

Ebizuka, N., Yokota, H., Kajino, F., Kawabata, K. S., **Iye, M.**, Sato, S.: 2008, Novel direct vision prism and Wollaston prism assembly for diffraction limit applications, SPIE 7018, 70184S6.

Endo, A., **Noguchi, T.**, **Kroug, M.**, **Shitov, S. V.**, Shan, W., **Tamura, T.**, **Kojima, T.**, **Uzawa, Y.**, **Sakai, T.**, Inoue, H., **Muraoka, K.**, Kohno, K.: 2008, A Novel THz SIS Mixer with a NbTiN-Ground Plane and SIS Micro-Trilayers Directly Grown on a Quartz Substrate, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 73-78.

Enya, K., et al. including **Tamura, M.**, **Nishikawa, J.**, **Murakami, N.**: 2008, Mid-infrared coronagraph for SPICA, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70102Z-1-10.

Ezawa, H., et al. including **Kawabe, R.**, **Iwashita, H.**, **Matsuo, H.**, **Okuda, T.**, **Oshima, T.**, **Sakai, T.**, **Tanaka, K.**, **Yamaguchi, N.**: 2008, New Archevements of ASTE: the Atacama Submillimeter Telescope Experiment, SPIE 7012, Eds. L. M. Stepp, R. Gilmozzi, 101208-1-9.

Fukushima, T.: 2008, Astrometry Course at University of Tokyo, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 523-524.

Fukushima, T., et al.: 2008, Report on Commission 4: Ephemerides, Trans. IAU 27A, Ed. K. van der Hucht, 5-11.

Furusawa, H., **Kosugi, G.**, Akiyama, M., **Takata, T.**, **Sekiguchi, K.**, **Furusawa, J.**: 2008, Subaru/XMM-Newton Deep Survey (SXDS) - Optical Imaging Survey and Photometric Catalogs, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 131-132.

Furusawa, H., et al. including **Komiyama, Y.**, **Miyazaki, S.**, **Utsumi, Y.**: 2008, Hyper Suprime-Cam: data analysis and management system, SPIE 7016, Eds. R. J. Brissenden, D. R.

Silva, 45.
García Pérez, A. E., et al. including **Aoki, W.**: 2008, A new sample of extremely/ultra metal-poor stars, Physica Scripta 133, 14036.
Gomez, Y., et al. including **Deguchi, S.**: 2008, HCO^+ Emission Possibly Related with a Shielding Mechanism that Protects Water Molecules in the Young PN K 3-35, Proc. of the IAU Symp. 251, Eds. S. Kwok, S. Sandford, 173-174.
Goossens, S., **Matsumoto, K.**, **Ishihara, Y.**, **Liu, Q.**, **Iwata, T.**, Namiki, N., **Noda, H.**, **Hanada, H.**, **Kikuchi, F.**, **Kawano, N.**, **Tsuruta, S.**, **Asari, K.**, **Ishikawa, T.**, **Sasaki, S.**: 2008, Initial results of global lunar gravity field recovery from Kaguya tracking data, Proc. 41th Lunar Planet. Symp.
Goossens, S., **Matsumoto, K.**, **Ishihara, Y.**, **Liu, Q.**, **Kikuchi, F.**, **Noda, H.**: 2008, Kaguya orbit determination and quality assessment, Proc. 18th JAXA Workshop on Astrodynamics and Flight Mechanics, 298-306.
Gopalswamy, N., Yashiro, S., **Shibasaki, K.**: 2008, Heating and Kinematics of an Eruptive Prominence Associated with a Fast Coronal Mass Ejection, AGU Spring Meeting 2008, SH31C-07.
Gordon, K. D., et al. including **Mizuno, N.**: 2009, Early results from the SAGE-SMC Spitzer legacy, Proc. of the IAU Symp. 256, Eds. J. Th. van Loon, J. M. Oliveira, 184-188.
Gouda, N., **Kobayashi, Y.**, Yamada, Y., **Yano, T.**: 2008, Infrared space astrometry project JASMINE, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 248-251.
Gouda, N., **Kobayashi, Y.**, Yamada, Y., **Yano, T.**, **Tsujimoto, T.**, Suganuma, M., Niwa, Y., Yamauchi, M.: 2008, JASMINE: constructor of the dynamical structure of the Galactic bulge, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 355-358.
Guyon, O.: 2008, Ultra-high-sensitivity wavefront sensing for extreme-AO, Space Telescopes and Instrumentation 2008: Adaptive Optics, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 70151K-1-10.
Guyon, O., et al. including **Tamura, M.**: 2008, Pupil mapping Exoplanet Coronagraphic Observer (PECO), SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70101Y-70101Y-9.
Hanada, H., et al. including **Kawano, N.**, **Asari, K.**, **Ishihara, Y.**, **Ishikawa, T.**, **Kikuchi, F.**, **Liu, Q.**, **Matsumoto, K.**, **Noda, H.**, **Tsuruta, S.**, **Goossens, S.**, **Petrova, N.**, **Sasaki, S.**: 2008, VLBI Observation of SELENE (KAGUYA) by VERA and International Network, IVS.
Hara, H.: 2008, Overview of EIS performance, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 11.
Hasegawa, S., Miyasaka, S., Tokimasa, N., Sogame, A., Ibrahimov, M. A., **Yoshida, F.**, Abe, M., **Kuroda, D.**: 2009 Mar 1 , BRz' Phase Function of Asteroid 4 Vesta During the 2006 Opposition, 39th Lunar and Planetary Science Conf., 40, 1503.
Hayakawa, T., Iwamoto, N., **Kajino, T.**, Shizuma, T., Umeda, H., Nomoto, K.: 2008, Universality of supernova gamma-process, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 111-116.
Hayakawa, T., Iwamoto, N., **Kajino, T.**, Shizuma, T., Umeda, H., Nomoto, K.: 2008, Empirical Solar Abundance Scaling Laws of Supernova Gamma-process Isotopes, AIP Conf. Proc. 1072, 100-105.
Hayakawa, T., Iwamoto, N., Shimizu, T., **Kajino, T.**, Umeda, H., Nomoto, K.: 2008, Universality of Photodisintegration Reaction Nucleosynthesis in Supernovae., Nucl. Phys. A805, 552-554.
Hayano, Y., **Takami, H.**, **Guyon, O.**, **Oya, S.**, **Hattori, M.**, **Saito, Y.**, **Watanabe, M.**, **Murakami, N.**, **Minowa, Y.**, **Ito, M.**, **Colley, S.**, **Eldred, E.**, **Golota, T.**, **Dinkins, M.**, **Kashikawa, N.**, **Iye, M.**: 2008, Current status of the laser guide star adaptive optic system for Subaru telescope, SPIE 7015, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 701510.
Hayashi, M., Motohara, K., Shimasaku, K., Onodera, M., Uchimoto, Y. K., **Kashikawa, N.**, **Yoshida, M.**: 2008, Near-Infrared Spectroscopy of BzK Galaxies with Subaru/MOIRCS, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 282.
Hodapp, K. W., et al. including **Suzuki, R.**, **Tamura, M.**, **Suto, H.**, **Kandori, R.**, **Morino, J.**, **Nishimura, T.**, **Takami, H.**, **Guyon, O.**, **Hashimoto, J.**, **Nishikawa, J.**, **Ukita, N.**, **Izumiura, H.**, **Hayashi, M.**, **Nakajima, T.**, **Usuda, T.**: 2008, HiCIAO: the Subaru Telescope's new high-contrast coronographic imager for adaptive optics, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 701419-701419-12.
Honma, M., et al. including **Iwadate, K.**, **Jike, T.**, **Kameya, O.**, **Kamohara, R.**, **Kawaguchi, N.**, **Kijima, M.**, **Kim, M. K.**, **Kobayashi, H.**, **Kuji, S.**, **Manabe, S.**, **Matsumoto, N.**, **Miyaji, T.**, **Oh, C.-S.**, **Oyama, T.**, **Sakai, S.**, **Sato, K.**, **Sato, M.**: 2008, Astrometry of Galactic star-forming regions with VERA, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 198-199.
Hosokawa, T., **Omukai, K.**: 2008, Evolution of Massive Protostars with High Accretion Rates, Massive Star Formation: Observations Confront Theory (ASP Conf. Ser. 387), Eds. H. Beuther, H. Linz, T. Henning, 255.
Ichikawa, T., et al. including **Maruyama, M.**, **Iye, M.**, Shimasaku, K.: 2008, Cryogenic VPH grisms for MOIRCS, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70141S8.
Ichimoto, K., **Katsukawa, Y.**, Tarbell, T., Shine, R. A., Hoffmann, C., Berger, T., Cruz, T., **Suematsu, Y.**, **Tsuneta, S.**, Shimizu, T., Lites, B. W.: 2007, On-orbit Performance of the Solar Optical Telescope aboard Hinode, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 5.
Ikeda, Y., Kobayashi, N., **Terada, H.**, Shibayama, A., Ozawa, A., Yasui, C., Kondo, S., **Pyo, T.-S.**, Kawakita, H.: 2008, High-efficiency silicon immersion grating by electron-beam lithography, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 701469-701469-12.
Imada, S., **Hara, H.**, **Watanabe, T.**, **Asai, A.**, **Kamio, S.**, Matsuzaki, K., Harra, L. K., Mariska, J. T.: 2008, Doppler Shifts in the Boundary of the Dimming Region, First Results from Hinode (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 102.
Imamura, T., et al. including **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**: 2008, Studying the Lunar Ionosphere with the SELENE Radio Science Experiment, Proc. 41th Lunar Planet. Symp.
Imamura, T., et al. including **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**: 2009, Studying the lunar ionosphere with the SELENE radio

science experiment, ISTS.
Inoue, H., **Muraoka, K.**, **Sakai, T.**, **Endo, A.**, Kohno, K., **Asayama, S.**, **Noguchi, T.**, **Ogawa, H.**: 2008, 350 GHz Sideband Separating Receiver for ASTE, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 281-285.
Inoue, M., Asada, K., **Nagai, H.**: 2008, A New Method to Detect Faraday Screen, Extragalactic Jets: Theory and Observation from Radio to Gamma Ray (ASP Conf. Ser. 386), Eds. T. A. Rector, D. S. De Young, 459.
Inoue, M., **Nagai, H.**, Asada, K., Saito, H., Tsuboi, M.: 2008, The Next Generation Space VLBI Project: VSOP-2, Extragalactic Jets: Theory and Observation from Radio to Gamma Ray (ASP Conf. Ser. 386), Eds. T. A. Rector, D. S. De Young, 262.
Inoue, M., Sato, M., Saito, H., Tusboi, M.: 2008, Next Generation Space VLBI Project: VSOP-2, AIP Conf. Proc. 1053, 377.
Inoue, S., Kusano, K., Masuda, S., Miyoshi, T., Yamamoto, T., **Magara, T.**, **Tsuneta, S.**, **Sakurai, T.**, Yokoyama, T.: 2008, Three-Dimensional Structure Analysis of Coronal Magnetic Field in AR NOAA 10930 Based on Vector Magnetogram Observations with Hinode/SOT, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 110-114.
Ishihara, D., et al. including **Ita, Y.**: 2008, Mid-infrared all-sky survey with AKARI/IRC, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 9.
Ishihara, D., et al. including **Ita, Y.**: 2009, AKARI Mid-Infrared All-Sky Survey, The Evolving ISM in the Milky Way and Nearby Galaxies, The Fourth Spitzer Science Center Conf., Eds. K. Sheth, A. Noriega-Crespo, J. Ingalls, R. Paladini, 30.
Ishikawa, R., **Tsuneta, S.**: 2008, New Form of Emerging Magnetic Fields in Plage Regions, First Results from Hinode (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 21.
Isobe, N., et al. including **Nakanishi, K.**, **Tosaki, T.**, **Shimajiri, Y.**, **Fukuhara, M.**: 2008, Suzaku Observation of the Blazar OJ287; Quiescence and Predicted Flare in 2007, 37th COSPAR Scientific Assembly, 1330.
Ita Y.: 2009, Period-Mbol Relations of Variable Stars in the Large Magellanic Cloud, AGB Stars and Related Phenomena, Eds. T. Ueta, N. Matsunaga, Y. Ita, 28.
Ita, Y., Onaka, T., Kato, D.: 2009 Mar 1 , AKARI IRC survey of the Large Magellanic Cloud: A new feature in the infrared color - magnitude diagram, Proc. of the IAU Symp. 256, Eds. J. Th. van Loon, J. M. Oliveira, 9-13.
Iwamuro, F., et al. including **Kimura, M.**, **Tamura, N.**, **Takato, N.**, **Tait, P.**: 2008, FMOS: the fiber multiple-object spectrograph: Part VI. Onboard performances and results of the engineering observations, SPIE 7014, Eds. I. S. McLean, M. M. Casali.
Iwata, I., Ohta, K., Sawicki, M., **Tamura, N.**, Akiyama, M., **Aoki, K.**: 2008, Differential Evolution of Lyman Break Galaxies from z=5 to 3, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 127.
Iwata, T., et al. including **Hanada, H.**, **Noda, H.**, **Kawano, N.**, **Matsumoto, K.**, **Tsuruta, S.**, **Kikuchi, F.**: 2009, Properties of SELENE Small Satellites; Rstar (Okina) and Vstar (Ouna), ISTS.
Iye, M.: 2008, High redshift galaxy surveys, SPIE 7016, Eds. R. J. Brissenden, D. R. Silva.
Iye, M., **Kashikawa, N.**, **Furusawa, H.**, Ota, K., Ouchi, M., Shimasaku, K.: 2008, Suprime-Cam LAE Survey at Redshift 7.3 – Ultimate Limit with New Red-Sensitve CCDs, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 61-62.
Izumiura, H.: 2009, AKARI's View of the Extended Dust Shells of Evolved Stars, AGB Stars and Related Phenomena, Eds. T. Ueta, N. Matsunaga, Y. Ita, 14-18.
Jenniskens, P., **Sato, M.**, **Watanabe, J.**: 2008, Orionid Meteors 2008, Central Bureau Electronic Telegrams, Ed. D. W. E. Green.
Jike, T., **Manabe, S.**, **Tamura, Y.**: 2008, Result from *K*-band Geodetic VLBI using VERA, Measuring the Future, Proc. of the 5th IVS General Meetings, Eds. A. Finkelstein, D. Behrend, 293-296.
Jike, T., **Manabe, S.**, **Tamura, Y.**, **Shizugami, M.**: 2008, VERA Geodetic Activities, IVS 2007 Annual Report, Eds. D. Behrend, K. D. Baver, 69-71.
Kadono, T., Sugita, S., Sako, S., Ootsubo, T., Kawakita, H., Honda, M., Miyata, T., **Furusho, R.**, **Watanabe, J.**: 2009, The Subsurface Structure of Comet 9P/Tempel 1 Projected into the Dust Plume, Deep Impact as a World Observatory Event: Synergies in Space, Time, and Wavelength, Eso Astrophysics Symposia, Eds. H. U. Käufl, C. Sterken, 143.
Kajino, T., **Kusakabe, M.**, **Kojima, K.**, **Yoshida, T.**, **Yamazaki, D. G.**, Ichiki, K., Mathews, G. J.: 2008, Neutrino Mass and Cold Dark Matter Particles in Big-Bang Nucleosynthesis, *Modern Physics Letters A*, **23**, 2447-2442.
Kajino, T., Sasaqui, T., **Yoshida, T.**, **Aoki, W.**: 2008, Neutrino Oscillation in Supernova and GRB Nucleosynthesis, *Modern Physics Letters A*, **23**, 1409-1418.
Kajisawa, M., et al. including **Suzuki, R.**, **Omata, K.**, **Tanaka, I.**, **Nishimura, T.**: 2008, Distant Red Galaxies in the MOIRCS Deep Survey, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 296.
Kamata, Y., **Miyazaki, S.**, **Nakaya, H.**, Tsuru, T. G., Tsunemi, H., Miyata, E., Muramatsu, M., Suzuki, H., Miyaguchi, K.: 2008, Evaluation of the fully-depleted back-illuminated CCD for Subaru Suprime-Cam, SPIE 7021, Eds. D. A. Dorn, A. D. Holland, 70211S.
Kamikura, M., **Naruse, M.**, **Asayama, S.**, **Satou, N.**, Shan, W., **Sekimoto, Y.**: 2008, Development of a 385-500 GHz Orthomode Transducer (OMT), Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 557-562.
Kamio, S., **Hara, H.**, **Watanabe, T.**: 2008, Velocity structure of bright points in a coronal hole, First Results from Hinode (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 35.
Kaneda, H., Onaka, T., Sakon, I., Matsumoto, H., **Suzuki, T.**: 2008, Polycyclic aromatic hydrocarbons in elliptical galaxies, Proc. of the IAU Symp. 251, Eds. S. Kwok, S. Sandford, 247-248.
Kaneda, H., **Suzuki, T.**, Haze, K., Okada, Y., Onaka, T., Sakon, I.: 2008, ISM in nearby elliptical galaxies revealed by AKARI and Spitzer, EAS Publication Series 31, Far-Infrared Workshop 2007, Eds. C. Kramer, S. Aalto R. Simon, 181-182.
Kawabata, K. S., et al. including **Nakaya, H.**, **Kamata, Y.**, **Miyazaki, S.**: 2008, Wide-field one-shot optical polarimeter: HOWPol, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70144L.
Kawada, M., et al. including **Matsuo, H.**: 2008, Imaging Fourier

transform spectrometer with photoconductive detector arrays: an application to the AKARI far-infrared instrument, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70100F.

Kawaguchi, T., **Nakanishi, K.**, Kohno, K., Ohta, K., **Aoki, K.**: 2008, ^{12}CO Observations on Narrow-Line Seyfert 1 Galaxies, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 249-250.

Kawaguchi, T., **Nakanishi, K.**, Kohno, K., Ohta, K., **Aoki, W.**: 2008, Molecular Gas in Narrow-Line seyfert 1 Galaxy: A Search for Coevolving Massive Black Holes and Galaxies, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 427-428.

Kawakatu, N., **Nagai, H.**, **Kino, M.**: 2009, Fate of baby radio galaxies: Dead or alive?, Astronomische Nachrichten, 330, 283-286.

Kawamura, A., Minamidani, T., Mizuno, Y., **Mizuno, N.**, Onishi, T., Mizuno, A., Fukui, Y.: 2009, Molecular Clouds and Star Formation in the Magellanic System by NANTEN, Globular Clusters - Guides to Galaxies, Eso Astrophysics Symposia, Eds. J. Th. van Loon, J. M. Oliveira, 121.

Kawanomoto, S., **Kajino, T.**, Suzuki, T. K., **Ando, H.**, **Aoki, W.**: 2008, ^{7}Li/^{6}Li Ratio in Distant Interstellar Media and Primordial ^{7}Li-Implementation in Big-Bang Cosmology and Galactic Chemical Evolution, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 21-26.

Keum, Y. Y., Ichiki, K., **Kajino, T.**: 2008, Neutrino Mass Bounds from Neutrinoless Double Beta Decays and Large, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 343-349.

Kikuchi, F., et al. including **Liu, Q.**, **Hanada, H.**, **Kawano, N.**, **Matsumoto, K.**: 2008, Pico-second Accuracy VLBI of the Two Sub-satellites of SELENE (KAGUYA) using Multi-Frequency and Same Beam Methods, Proc. 41th Lunar Planet. Symp.

Kikuchi, F., et al. including **Liu, Q.**, **Matsumoto, K.**, **Ishihara, Y.**, **Hanada, H.**, **Kawano, N.**, **Sasaki, S.**: 2009, Differential Phase Delay Estimation in VRAD mission of SELENE (KAGUYA), ISTS.

Kim, S., et al. including **Tamura, N.**, **Arimoto, N.**, **Yamada, Y.**: 2008, M87 Globular Cluster System, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 471.

Kimura, M., Maihara, T., Iwamuro, F., Akiyama, M., **Tamura, N.**, **Takato, N.**, Ohta, K., Eto, S.: 2008, FMOS: the Fibre Multi-Object Spectrograph: Part VII. Results of PIR engineering run, SPIE 7014, Eds. I. S. McLean, M. M. Casali.

Kitagawa, M., **Ohishi, M.**: 2008, Measurements of the Radiated Electric Field and the Common Mode Current from the In-house Broadband Power Line Communications in Residential Environment, EMC Europe 2008, 433-438.

Klioner, S. A., et al. including **Fukushima, T.**: 2008, Report on Commission 52: Relativity in Fundamental Astronomy, Trans. IAU 27A, Ed. K. van der Hucht, 55-59.

Kobayashi, H., **Kawaguchi, N.**, **Manabe, S.**, **Shibata, K. M.**, **Honma, M.**, **Tamura, Y.**, **Kameya, O.**, **Hirota, T.**, **Jike, T.**, Imai, H., Omodaka, T.: 2008, Phase referencing VLBI astrometry observation system: VERA, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 148-155.

Kobayashi, M., Totani, T., **Nagashima, M.**: 2008, Lyman-Alpha Emitters in the Hierarchically Clustering Galaxy Formation, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 32.

Kobayashi, N., Yasui, C., Tokunaga, A. T., **Saito, M.**: 2008, Extreme Outer Galaxy: A Laboratory of Star Formation in an Early Epoch of Galaxy Formation, Formation and Evolution of Galaxy Disks (ASP Conf. Ser. 396), Eds. J. G. Funes, E. M. Corsini, 213.

Kobayashi, Y., **Gouda, N.**, **Yano, T.**, Suganuma, M., Yamauchi, M., Yamada, Y., Sako, N., Nakasuka, S.: 2008, The current status of the Nano-JASMINE project, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 270-271.

Kodama, T.: 2008, Proto-clusters at z>>1 as the site of early-type galaxies formation, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 305-313.

Kohno, K., et al. including **Muraoka, K.**, **Tanaka, K.**, **Iono, D.**, **Nakanishi, K.**, **Tosaki, T.**, **Sawada, T.**, **Kawabe, R.**, **Ezawa, H.**, **Yamaguchi, N.**, **Tamura, Y.**: 2008, Tracing Star Formation in Galaxies with Molecular Line and Continuum Observations, EAS Publication Series 31, Far-Infrared Workshop 2007, Eds. C. Kramer, S. Aalto R. Simon, 65-71.

Kohno, K., et al. including **Tamura, Y.**, **Nakanishi, K.**, **Iono, D.**, **Takata, T.**, **Tanaka, K.**, **Oshima, T.**, **Yamaguchi, N.**, **Matsuo, H.**, **Ezawa, H.**, **Kawabe, R.**: 2008, AzTEC on ASTE Survey of Submillimeter Galaxies, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 264-267.

Kojima, K., **Yamazaki, D. G.**, **Kajino, T.**: 2008, Cosmological Constraint on 'Neutrino Mass from CMB anisotropies with Primordial Magnetic Field', Proc. of 6th Int. Heidelberg conf. Dark Matter in Astroparticle and Particle Physics, Eds. H. V. Klapdor-kleingrothaus, G. F. Lewis , 510-513.

Kojima, K., **Yamazaki, D. G.**, **Kajino, T.**: 2008, Neutrino-Mass Effects on the CMB anisotropies in a Cosmological Model with Primordial Magnetic Field, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 454-456.

Kojima, T., **Uzawa, Y.**, Shan, W.-L., **Fujii, Y.**, **Takeda, M.**, **Kroug, M.**, **Shitov, S.**, **Ogawa, H.**: 2008, Characterization of wave-guide components for the ALMA band 10, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 529.

Kokubo, E., Ida, S.: 2008, Formation of Terrestrial Planets from Protoplanets: Statisitics of Planetary Spin, Extreme Soloar Systems, Eds. D. Fischer, F. A. Rasio, S. E. Thorsett, A. Wolszczan, 261-262.

Kokubo, E.: 2008, Formation of Terrestrial Planets from Proto-planets, AGU Fall Meeting 2008, P14B-01.

Komiyama, Y., et al.: 2008, Galaxies in the Local Universe: Viewed at the Subaru Prime Focus, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 449.

Komiyama, Y., **Miyazaki, S.**, **Kawanomoto, S.**, **Morokuma, T.**, **Nakaya, H.**, **Furusawa, H.**, **Tanaka, Y.**: 2008, Hyper Suprime-Cam: camera dewar, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70144V160.

Komugi, S., Sofue, Y., **Onodera, S.**, Egusa, F., **Muraoka, K.**, Nakanishi, H., Young, J. S.: 2008, The Star Formation Law as a Function of Galactic Properties,, Pathways Through an Eclectic Universe (ASP Conf. Ser. 390), Eds. J. H. Knapen, T. J. Mahoney, A. Vazdekis, 161-165.

Kondo, S., Kobayashi, N., Minami, A., Okoshi, K., **Minowa, Y.**, **Tsujimoto, T.**, Churchill, C. W., **Terada, H.**, **Pyo, T.-S.**, **Iye, M.**: 2008, Study of z=3.5 Mg II Absorption Systems with Subaru IRCS Near-Infrared High-Resolution Spectroscopy, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 209-210.

Kashikawa, N.: 2008, Panoramic View of Cosmic Frontier with Subaru, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 3.

Konishi, M., et al. including **Suzuki, R.**, **Tanaka, I.**, **Omata, K.**, **Nishimura, T.**: 2008, A Morphological Study of Luminous Infrared Galaxies at Redshift $z \sim 1$ in the MOIRCS Deep Survey, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 211.

Kotake, K., Suwa, Y., **Yasutake, N.**: 2008, Gravitational waves from core-collapse supernovae and their related compact objects, EAS Publications Ser. 30, 95-100.

Koyama, Y., **Kodama, T.**, Tanaka, M., Shimasaku, K., Okamura, S.: 2008, Panoramic and Multi-wavelength study of the distant cluster RXJ1716 at z=0.81, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 361-362.

Kubo, M., et al. including **Tsuneta, S.**, **Suematsu, Y.**, **Katsukawa, Y.**: 2008, Evolution of Magnetic Fields at the Boundary of the Penumbra, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 79.

Kudo, Y., et al. including **Yoshida, M.**, **Yanagisawa, K.**, **Nagayama, S.**, **Toda, H.**, **Shimizu, Y.**, **Kuroda, D.**, **Watanabe, J.**, **Fukushima, H.**: 2009, The state of development and observation of MITSuME telescope, Astrophysics with All-Sky X-Ray Observations, Proc. of the RIKEN Symp., 344.

Kudoh, T.: 2008, Nonlinear Alfvén wave model of spicules and coronal heating, Proc. of the IAU Symp. 247, Eds. R. Erdelyi, C. A. Mendoza-Briceno, 195.

Kumkova, I. I., Evans, D. W., Platais, I., Andrei, A. H., Fresneau, A., Popescu, P. P., Scholz, R. D, **Sôma, M.**, Zacharias, N., Zhu. Z.: 2008, Commision 8: Astrometry, Trans. IAU 27A, Ed. K. van der Hucht, 23-33.

Kuroda, D., **Yoshida, M.**, **Yanagisawa, K.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB 081222: MITSuME optical observation, GRB Coordinates Network, Circular Service, 8724, 1.

Kusakabe, M., **Kajino, T.**, Boyd, R. N., **Yoshida, T.**, Mathews, G. J.: 2008, Effect of Negatively-Charged Massive Particles on Big-Bang Nucleosynthesis and a Solution to the Lithium Problems, *Modern Physics Letters A*, **23**, 1668-1674.

Kusakabe, M., **Kajino, T.**, Boyd, R. N., **Yoshida, T.**, Mathews, G. J.: 2008, Big-Bang Nucleosynthesis with Negatively-Charged Massive Particles as a Cosmological Solution to the ^{6}Li and ^{7}Li Problems, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 15-20.

Leroy, A. K., Bolatto, A. D., Rosolowsky, E., Stanimirović, S., **Mizuno, N.**, Bot, C., Israel, F., Walter, F., Blitz, L.: 2009, The state of molecular gas in the Small Magellanic Cloud, Proc. of the IAU Symp. 256, Eds. J. Th. van Loon, J. M. Oliveira, 154-159.

Li, J., Shen, Z. Q., **Miyazaki, A.**, **Miyoshi, M.**, **Tsutsumi, T.**, Tsuboi, M., Huang, L., Sault, B.: 2008, The 3-mm flux density monitoring of Sagittarius A* with the ATCA, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 204-205.

Lites, B. W., et al. including **Katsukawa, Y.**, **Tsuneta, S.**, **Suematsu, Y.**: 2008, Magnetic Fields of the Quiet Sun: A New Quantitative Perspective From Hinode, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 17.

Luzum, B. J., et al. including **Fukushima, T.**: 2008, Report on Division I / Working Group Numerical Standards of Fund-amental Astronomy, Trans. IAU 27A, Ed. K. van der Hucht, 60-62.

Luzum, B. J., et al. including **Fukushima, T.**: 2008, Current Status of the IAU Working Group for Numerical Standards of Fundamental Astronomy, Proc. Journées Systèmes de Référence Spatio-temporels 2007, Ed. N. Capitaine, 55.

Machida, M., Matsumoto, R.: 2009, Magneto-hydrodynamic Simulations of Excitation of Low-Frequency QPOs in Black Hole Candidates, Astrophysics with All-Sky X-Ray Observations, Proc. of the RIKEN Symp., 142.

Magara, T., **Katsukawa, Y.**, Ichimoto, K., **Tsuneta, S.**, Yokoyama, T., Nagata, S., Inoue, S.: 2008, Evolution of Magnetic Field and Flow in NOAA 10930 Obtained by Hinode, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 135.

Martinache, F., **Guyon, O.**, **Lozi, J.**, **Tamura, M.**, Hodapp, K., **Suzuki, R.**, **Hayano, Y.**, McElwain, M. W.: 2009, The Subaru Coronagraphic Extreme AO Project, AAS 213, 398.

Mathews, G. J., Ichiki, K., **Kajino, T.**, Lan, N. Q., Zhao, X.: 2008, Alternative Unified Views on Dark Matter and Dark Energy, *Modern Physics Letters A*, **23**, 1372-1383.

Matsumoto, R., **Machida, M.**, Oda, H.: 2009, Variability Science in Accretion Disc Theory, Astrophysics with All-Sky X-Ray Observations, Proc. of the RIKEN Symp., 126.

Matsuo, H., Hibi, Y., Nagata, H., Ariyoshi, S., Otani, C., Ikeda, H., Fujiwara, M.: 2008, Design of Superconducting Terahertz Digicam, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 466-472.

Matsuo, H., **Hibi, Y.**, Nagata, H., Nakahashi, M., Murakoshi, Y., Arai, H., Ariyoshi, S., Otani, C., Ikeda, H., Fujiwara, M.: 2008, System design of submillimeter-wave imaging array SISCAM, SPIE 7020, Eds. W. D. Duncan, W. S. Holland, 702015.

Matsuo, T., Shibai, H., Kawada, M., Hattori, M., Ohta, S. I., **Matsuo, H.**: 2008, Novel spectral imaging method for Fizeau interferometer, SPIE 7013, Eds. M. Schöller, W. C. Danchi, F. Delplancke, 70132F.

Minamidani, T., **Mizuno, N.**, Mizuno, Y., Kawamura, A., Onishi, T., **Tatematsu, K.**, **Hasegawa, T.**, Ikeda, M., Fukui, Y.: 2009, An observational study of GMCs in the Magellanic Clouds with the ASTE telescope, Proc. of the IAU Symp. 256, Eds. J. Th. van Loon, J. M. Oliveira, 256-260.

Minowa, Y., **Takami, H.**, **Watanabe, M.**, **Hayano, Y.**, Miyake, M., **Iye, M.**, **Oya, S.**, **Hattori, M.**, **Murakami, N.**, **Guyon, O.**, **Saito, Y.**, **Itoh, M.**, **Colley, S.**, **Dinkins, M.**, **Eldred, M.**, **Golota, T.**: 2008, Development of a dichroic beam splitter for Subaru AO188, SPIE 7015, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 701561-1-8.

Misawa, T., Eracleous, M., Charlton, J. C., Chartas, G., **Kashikawa, N.**: 2008, Dramatically Variable C IV Mini-Broad Absorption Line System in the Quasar HS 1603+3820, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 423.

Mitsui, K., **Okada, N.**, **Fukushima, M.**, **Nishino, T.**, Okamoto, Y. K., Kataza, H., Onaka, T.: 2008, Fabrication of slicer optics of mid-infrared spectrometer with an image slicer (MIRSIS) for ground-based astronomy, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 701427.

Miura, N., Noto, Y., Kato, S., Kuwamura, S., Baba, N., **Hanaoka, Y.**, Nagata, S., Ueno, S., Kitai, R., **Takami, H.**: 2009, Solar Adaptive Optic system at the Hida Observatory, SPIE 7015, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 70156U-1-U-8.

Miyata, T., et al. including **Ezawa, H.**: 2008, Site Evaluations of the Summit of Co. Chajnantor for Infrared Observations, SPIE 7012, Eds. L. M. Stepp, R. Gilmozzi, 701243-1-8.

Miyatake, H., Uchida, T., Fujimori, H., Mineo, S., **Nakaya, H.**, Aihara, H., **Miyazaki, S.**: 2008, Prototype Readout Module for Hyper Suprime-Cam, IEEE Nuclear Science Symp. N02-25, 737.

Mori, Y. A., Nakajima, H., Shimokawabe, T., Kawai, N., **Kuroda, D.**, **Yoshida, M.**, **Yanagisawa, K.**, **Shimizu, Y.**, **Toda, H.**, **Nagayama, S.**: 2008, GRB081203A: MITSuME optical observation, GRB Coordinates Network, Circular Service, 8619, 1.

Mori, Y., Sekiguchi, T., Sugita, S., Matsunaga, N., Fukushi, H., Kaneyasu, N., Kawadu, T., **Kandori, R.**, **Nakajima, Y.**, **Tamura, M.**: 2009, One Month of Near-IR Imaging Photometry of Comet 9P/Tempel 1, Deep Impact as a World Observatory Event: Synergies in Space, Time, and Wavelength, Eso Astrophysics Symposia, Eds. H. U. Käufl, C. Sterken, 323.

Morokuma, T., et al. including **Sekiguchi, K.**, **Furusawa, H.**, **Kashikawa, N.**: 2008, Wide-Field Optical Variability Survey for Low-Luminosity AGN with Suprime-Cam, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 417.

Morokuma, T., **Komiyama, Y.**, **Miyazaki, S.**, **Nakaya, H.**, **Furusawa, H.**, **Tomono, D.**, **Kawanomoto, S.**, **Tanaka, Y.**: 2008, Hyper Suprime-Cam: autoguider and Shack-Hartmann systems, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 161.

Motohara, K., et al. including **Uraguchi, F.**, **Takato, N.**: 2008, Seeing environment at a 5640m altitude of Co. Chajnantor in northern Chile, SPIE 7012, Eds. L. M. Stepp, R. Gilmozzi.

Motohara, K., **Hayashi, M.**, Shimasaku, K., **Yoshida, M.**, **Kashikawa, N.**, **Kodama, T.**: 2008, Deep- and Wide-field K-band Imaging of the Subaru Deep Field: Implications for Galaxy Formation at *z*~2, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 274.

Murakami, N., Uemura, R., Baba, N., Shibuya, H., **Nishikawa, J.**, Abe, L., **Tamura, M.**, Hashimoto, N.: 2008, Laboratory experiments on the 8-octant phase-mask coronagraph, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70101J-1-8.

Nagai, H., Asada, K., Doi, A., Kameno, S., **Inoue, M.**: 2008, Kinematic and Synchrotron Ages of Compact Symmetric Objects, Extragalactic Jets: Theory and Observation from Radio to Gamma Ray (ASP Conf. Ser. 386), Eds. T. A. Rector, D. S. De Young, 290.

Nagashima, M., Okamoto, T.: 2008, Chemical Abundance Patterns in the Local Dwarf Galaxies in the CDM Universe, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 475.

Nagata, H., Kobayashi, J., **Matsuo, H.**, **Hibi, Y.**, Nakahashi, M., Ikeda, H., Fujiwara, M.: 2008, Development of a cryogenic GaAs AC-coupled CTIA readout for far-infrared and submillimeter detectors, SPIE 7020, Eds. W. D. Duncan, W. S. Holland, 70202Q.

Nagayama, T., Omodaka, T., Handa, T., **Sawada, T.**, Iahak, H. B., Matsuyama, N.: 2008, A Wide Survey in NH_3 Lines of the Central 200 pc Around the Galactic Center with Kagoshima 6 Meter Radio Telescope, Mapping the Galaxy and Nearby Galaxies, Eds. K. Wada, F. Combes, 361.

Nakagawa, A., Omodaka, T., **Shibata, K. M.**, Kurayama, T., Imai, H., Kameno, S., Tsushima, M., **Matsumoto, N.**, Matsui, M.: 2008, Parallax measurement of the Galactic Mira variables with VERA , Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 206-207.

Nakajima, K., Ebizuka, N., **Iye, M.**, Kodate, K.: 2008, Optimal fabrication of volume phase holographic grism with high efficiency and high dispersion, and its applications for astronomical observation, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70741Q11.

Nakajima, T., **Sakai, T.**, **Asayama, S.**, Kimura, K., Kawamura, M., Yonekura, Y., **Ogawa, H.**, **Kuno, N.**, **Noguchi, T.**, Tsuboi, M., **Kawabe, R.**: 2008, Development of a Waveguide-Type Dual-Polarization Sideband-Separating SIS Receiver System in 100 GHz Band for the NRO 45-m Radio Telescope, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 286-291.

Nakamura, K.: 2008, Consistency relations between the source terms in the second-order Einstein equations for cosmological perturbations, The 8th Workshop on General Relativity and Gravitation in Japan, Ed. Y. Kojima.

Nakashima, J., **Deguchi, S.**, Imai, H., Kembell, A.: 2008, Molecular Line Observations of the SiO Maser Source IRAS 19312+1950, Proc. of the IAU Symp. 251, Eds. S. Kwok, S. Sandford.

Nakata, F., **Kodama, T.**, Tanaka, M.: 2008, Spectroscopic Study of Galaxies within the Structure around Cl~0939+4713, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 371-372.

Nakaya, H., Uchida, T., Miyatake, H., Aihara, H., **Doi, Y.**, **Furusawa, H.**, **Karoji, H.**, **Kamata, Y.**, **Kawanomoto, S.**, **Komiyama, Y.**, **Miyazaki, S.**, **Morokuma, T.**, Tanaka, M., **Tanaka, Y.**: 2008, Hyper Suprime-Cam: CCD readout electronics, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70144X162.

Naruse, M., **Kamikura, M.**, **Sekimoto, Y.**, **Ito, T.**, **Sugimoto, M.**, **Iizuka, Y.**: 2008, Near-field Beam and Cross-polarization Pattern Measurement of ALMA Band 8 Cartridges, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 534-539.

Nishikawa, J., Yokochi, K., Abe, L., **Murakami, N.**, Kotani, T., **Tamura, M.**, Kurokawa, T., Tavrov, A. V., Takeda, M.: 2008, Virtual wavefront compensation and speckle reduction in coronagraph by unbalanced nulling interferometer (UNI) and phase and amplitude correction (PAC), SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70102A-1-5.

Niwa, Y., **Arai, K.**, **Ueda, A.**, Sakagami, M., **Gouda, N.**, **Kobayashi, Y.**, Yamada, Y., **Yano, T.**: 2008, Laser interferometric high-precision geometry (angle and length) monitor for JASMINE, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 280-281.

Noguchi, T., **Suzuki, T.**, **Endo, A.**, **Tamura, T.**: 2009, Effect of the energy-gap broadening on subgap current of SIS junctions, IEICE Technocal Report, 108, 11-16.

Noumaru, J., et al. including **Kawai, J. A.**, **Schubert, K.**, **Yagi, M.**, **Takata, T.**, **Winegar, T.**, **Scanlon, T.**: Subaru Telescope Network III (STN-III): more effective, more operation-oriented, and more inexpensive solutions for the observatory's needs, SPIE 7016, Eds. R. J. Brissenden, D. R. Silva, 701613-1-9.

Ohishi, N., Yoshizawa, M., **Nishikawa, J.**, **Murakami, N.**, **Torii, Y.**, **Suzuki, S.**, **Kubo, K.**, **Iwashita, H.**, Kondo, Y.: 2008, Recent progress at the MIRA: development of fringe tracking system, SPIE 7013, Eds. M. Schöller, W. C. Danchi, F. Delplancke, 701305-1-7.

Ohnishi, K., Hosokawa, M., **Fukushima, T.**: 2008, Macro Lens Toward the Galactic Center , Mapping the Galaxy and Nearby Galaxies, Eds. K. Wada, F. Combes, 369.

Ohnishi, N., Iwakami, W., Sugai, K., **Kotake, K.**, Yamada, S.: 2008, Roles of shock instability interacting with neutrino radiation on supernova explosions, American Physical Society.

Ohta, K., Yabe, K., **Iwata, I.**, Sawicki, M., Akiyama, M., **Tamura, N.**, **Aoki, K.**: 2008, Evolution of Star-forming Galaxies seen from Lyman-break Galaxies at z~5, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 227.

Ohta, M., Tatsuda, S., Hashizume, K., Wada, T., Sumiyoshi, K., Otsuki, K., **Kajino, T.**, Koura, H., Chiba, S., Aritomo, Y.: 2008, Systematic study for the shell effect in the fission fragment mass distribution ruptured from neutron rich nuclei, Nucl. Phys. A805, Eds. S. Nagamiya, et al., 558-560.

Okamoto, S., et al. including **Arimoto, N.**, **Yamada, Y.**: 2008, The Star Formation History and Stellar Population Structures in the Sextans Dwarf Spheroidal Galaxy, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 469.

Okamoto, Y. K., Kataza, H., Sato, K., Manabe, K., **Mitsui, K.**, **Okada, N.**, **Fukushima, M.**, **Nishino, T.**, Tomita, K., Tosa, M., Onaka, T.: 2008, Development of mid-infrared spectrometer with an image slicer (MIRSIS) for ground-based astronomy: developing optical and mechanical mounts, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70142B.

Okoshi, K., **Nagashima, M.**, **Gouda, N.**, **Minowa, Y.**: 2008, H I-Selected Galaxies as a Probe of Galactic Disks, Formation and Evolution of Galaxy Disks (ASP Conf. Ser. 396), Eds. J. G. Funes, E. M. Corsini, 489.

Omata, K., **Nishimura, T.**, **Colley, S.**, **Cook, D.**, **Gorman, W.**, **Magrath, B.**, **Ramos, L.**, **Kleinman, S.**, Tokoku, C., **Konishi, M.**, **Yoshikawa, T.**, **Tanaka, I.**, **Suzuki, R.**: 2008, Automatic pre-cooling system for large infrared instruments, SPIE 7018, Eds. A.-E. Eli, L. Dietrich, 70182E-12.

Omiya, M., et al. including **Izumiura, H.**, **Yoshida, M.**, **Kambe, E.**: 2008, A Korea-Japan planet search program: Current status and discovery of a brown dwarf candidate, Proc. of the IAU Symp. 249, Eds. Y.-S. Sun, S. Ferraz-Mello, J.-L. Zhou, 53-56.

Onaka, T., Kaneda, H., Wada, T., Sakon, I., **Ita, Y.**, Takagi, T., Kim, W.: 2008, In-orbit focal adjustment of the AKARI telescope with and without liquid helium cryogen, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 87.

Onaka, T., et al. including **Ita, Y.**, **Tamura, M.**: 2009, AKARI Large Area Survey of the Large Magellanic Cloud, The Evolving ISM in the Milky Way and Nearby Galaxies, The Fourth Spitzer Science Center Conf., Eds. K. Sheth, A. Noriega-Crespo, J. Ingalls, R. Paladini, 49.

Onodera, M., Daddi, E., Kong, X., **Arimoto, N.**, Renzini, A., Brusa, M., Finoguenov, A., 2008, Discovery of an Evolved Galaxy Cluster at z>2, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 363.

Ootsubo, T., Sugita, S., **Watanabe, J.**, Honda, M., Kawakita, H., Kadono, T., **Furusho, R.**: 2009, Subaru/COMICS Mid-Infrared Spectroscopic Observations of the Dust Plume from Comet 9P/Tempel, Deep Impact as a World Observatory Event: Synergies in Space, Time, and Wavelength, Eso Astrophysics Symposia, Eds. H. U. Käufl, C. Sterken, 131.

Otsuka, M., **Izumiura, H.**, **Tajitsu, A.**, Hyung, S.: 2008, The Origin and Evolution of the Extremely Metal-Poor Halo Planetary Nebulae, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 427-429.

Oya, S., **Minowa, Y.**, **Hattori, M.**, **Wattanabe, M.**, **Hayano, Y.**, **Itoh, M.**, **Saito, Y.**, **Takami, H.**, **Iye, M.**, **Guyon, O.**, **Colley, S.**, **Dinkins, M.**, **Eldred, M.**, **Golota, T.**: 2008, Characterization of vibrating shape of a bimorph deformable mirror, SPIE 7015, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 701534-8.

Packham, C., et al. including **Tamura, M.**: 2008, Design of a mid-IR polarimeter for SOFIA, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70142H-14.

Petitpas, G. R., et al. including **Iono, D.**: 2009, Luminous Infrared Galaxies with the Submillimeter Array: High Angular Resolution Observations of Warm Molecular Gas in VV 114, Bulletin of AAS 41, Eds. S. Kwok, S. Sandford, 327.

Reale, F., Parenti, S., Reeves, K. K., Weber, M., Bobra, M. G., Barbera, M., **Kano, R.**, Narukage, N., **Shimojo, M.**, Sakao, T., Peres, G., Golub, L.: 2008, Hinode/XRT Diagnostics of Loop Thermal Structure, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 50.

Reznikova, V. E., Melnikov, V. F., **Shibasaki, K.**, Gorbikov, S. P., Pyatakov, N. P., Myagkova, I. N., Ji, H.: 2009, Dynamics of microwave brightness distribution in the giant 24 August 2002 flare loop, Proc. of the IAU Symp. 257, Eds. N. Gopalswamy, D. F. Webb, 345-347.

Saito, T., Shimasaku, K., Okamura, S., Ouchi, M., Akiyama, M., **Yoshida, M.**, Ueda, Y.: 2008, Galaxy Formation and Evolution Probed with Lyman-α blobs, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 280.

Sakon, I., et al. including **Ita, Y.**: 2008, Data reduction techniques for slit and slit-less spectroscopy of diffuse emission with the Infrared Camera onboard AKARI, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 88.

Sasaki, T., Yao, Y., Wang, J.-J., **Yoshida, M.**, **Ohshima, N.**, **Mikami, Y.**, **Okada, N.**, **Koyanao, H.**, **Ando, H.**: 2008, Collaborative Site Testing in West China and a New Candidate Site around Barkol, Proc. of 10th Asian-Pacific Regional IAU Meeting 2008.

Sato, B., **Izumiura, H.**, Toyota, E., **Kambe, E.**, Ikoma, M., Omiya, M., Masuda, S., **Takeda, Y.**, Murata, D., Itoh, Y., **Ando, H.**, **Yoshida, M.**, **Kokubo, E.**, Ida, S.: 2008, Properties of Planets around G, K Giants, Extreme Solar Systems (ASP Conf. Ser. 398), Eds. D. Fischer, F. A. Rasio, S. E. Thorsett, A. Wolszczan, 67-70.

Sato, M., Akiyama, R., Takayama, S., Matsubara, A., **Iye, M.**, **Akitaya, H.**, **Mastuo, H.**, Iguchi, M.: 2008, Near Net Sintering of Zero Expansion-Pore free Ceramics by Microwave, GCMEA 2008; the first Global Congress on Microwave Energy Applications.

Sawada, T., Koda, J., Handa, T., **Sugimoto, M.**, **Hasegawa, T.**: 2008, NRO/CSO/ASTE Galactic Plane CO Survey, Mapping the Galaxy and Nearby Galaxies, Eds. K. Wada, F. Combes, 374.

Sekimoto, Y., **Iizuka, Y.**, **Satou, N.**, **Ito, T.**, **Kumagai, K.**, **Kamikura, M.**, **Naruse, M.**, Shan, W. L.: 2008, Development of ALMA Band 8 (385-500 GHz) Cartridge, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 253-257.

Seta, H., Tashiro, M., Isobe, N., Yaji, Y., Hayashida, M., **Nakanishi, K.**, **Tosaki, T.**, Kohno, K., **Shimajiri, Y.**, **Fukuhara, M.**, Sasada, M., Arai, A., Umemura, M.: 2008, Suzaku Observation of the OJ 287, Quiescence and Predicted Flare in 2007, Proc. of the Workshop on Blazar variability across the electromagnetic spectrum, PoS063-1-6 (online).

Shan, W., Takeda, M., **Kojima, T.**, **Uzawa, Y.**, Shi, S., Wang, Z.: 2008, Design and Performance of Waveguide Mixers with All NbN tunnel junctions on MgO substrates, Proc. of the 19th Int. Symp. on Space THz Technology, Ed. W. Wild, 78-85.

Shibasaki, K.: 2008, Leakage of Sub-Photospheric Hot Plasma through Magnetic Flux Tube, AGU Fall Meeting 2008, SH41A-1614.

Shimasaku, K., **Hayashi, M.**, Motohara, K., **Kashikawa, N.**, **Kodama, T.**, Ouchi, M.: 2008, Dark-Halo Masses, Star Formation Rates, and Stellar Masses of High-Redshift Galaxies, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 75.

Shimojo, M.: 2008, The relationship between the magnetic field and the coronal activities in the polar region, 37th COSPAR Scientific Assembly, E23-0003-08.

Shimokawabe, T., et al. including **Yoshida, M.**, **Yanagisawa, K.**, **Nagayama, S.**, **Toda, H.**, **Shimizu, Y.**, **Kuroda, D.**, **Watanabe, J.**, **Fukushima, H.**: 2008, MITSuME: multicolor optical/NIR telescopes for GRB afterglows, AIP Conf. Proc. 1000, 543-546.

Shimonishi, T., Onaka, T., Kato, D., Sakon, I., **Ita, Y.**, Kawamura, A., Kaneda, H.: 2009, AKARI near-infrared spectroscopy: Detection of H_2O and CO_2 ices toward young stellar objects in the Large Magellanic Cloud, Proc. of the IAU Symp. 256, Eds. J. Th. van Loon, J. M. Oliveira, 233-238.

Sôma, M., Hayamizu, T., Miyashita, K., Setoguchi, T., Hirose, T.: 2008, Occultation by (90) Antiope and by and its satellite Linus, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 130-131.

Spurny, P., et al. including **Watanabe, J.**: 2008, Commission 22: Meteors, Meteorites and Interplanetary Dust, Trans. IAU 27A, Ed. K. van der Hucht, 174-178.

Suematsu, Y., Ichimoto, K., **Katsukawa, Y.**, Shimizu, T., **Okamoto, T.**, **Tsuneta, S.**, Tarbell, T., Shine, R. A.: 2008, High resolution observations of spicules with *Hinode*/SOT, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 27.

Suematsu, Y., Ichimoto, K., **Katsukawa, Y.**, **Tsuneta, S.**, Shimizu, T.: 2008, Instrument Design and On-Orbit Performance of the Solar Optical Telescope Aboard Hinode (Solar-B), Proc. of Int. Conf. on Space Optics 2008, Ed. J. Costeraste, 2-8.

Suganuma, M., **Kobayashi, Y.**, **Gouda, N.**, **Yano, T.**, Yamada, Y., **Takato, N.**, **Yamauchi, M.**: 2008, Development of a very small telescope for a milli-arcsec space astrometry, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 284-285.

Sumiyoshi, M., et al. including **Morokuma, T.**, **Yoshida, M.**, **Hayashi, M.**, **Kashikawa, N.**, **Kodama, T.**: 2008, Testing the Target Selection for Future Spectroscopic BAO Surveys by SDF and SXDS Data, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 487.

Suzuki, R., Tokoku, C., Ichikawa, T., Uchimoto, Y. K., Konishi, M., Yoshikawa, T., **Tanaka, I.**, Yamada, T., **Omata, K.**, **Nishimura, T.**: 2008, Multi-Object Infrared Camera and Spectrograph (MOIRCS) for the Subaru Telescope I. Imaging.

Suzuki, T., Chiba, S., Yoshida, T., Higashiyama, K., Honma, M., Kajino, T., Otsuka, T.: 2008, Neutrino-Nucleus Reactions based on Recent Advances in Shell-Model Calculations, Nuclear Physics A, 579-581.,

Suzuki, T., Chiba, S., **Yoshida, T.**, Honma, M., Higashiyama, K., Umeda, H., Nomoto, K., **Kajino, T.**, Otsuka, T.: 2008, Neutrino-Nucleus Reactions and Nucleosynthesis, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 321-328.

Suzuki, T., Chiba, S., **Yoshida, T.**, Honma, M., Higashiyama, K., Umeda, H., Nomoto, K., **Kajino, T.**, Otsuka, T.: 2008, Spin-Dependent Transitions in Nuclei and Neutrino-Nucleus Reactions, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 51-55.

Suzuki, T., **Yoshida, T.**, Chiba, S., Honma, M., Higashiyama, K., Umeda, H., Nomoto, K., **Kajino, T.**, Otsuka, T.: 2008, Neutrino Nucleus Reactions and Nucleosynthesis in Stars, Proc. of the Int. Symp. on Nuclear Astrophysics - Nuclei in the Cosmos - X, Eds. H. Schatz, et al., 123.

Suzuki, T., Kaneda, H., Nakagawa, T., Makiuti, S., Okada, Y., Shibai, H., Kawada, M.: 2009, Spatial Distribution of Cold and Warm Interstellar Dust in M101 Resolved with AKARI/Far-Infrared Surveyor (FIS), eimw.confE, 63.

Suzuki, T., **Noguchi, T.**, **Endo, A.**, **Matsuo, H.**: 2009, Origin of subgap current in an SIS junction, IEICE Technocal Report, 108, 17-21.

Takato, N., Ichikawa, T., **Uraguchi, F.**, Lundock, R., Murata, C., Taniguchi, Y., Motoyama, H., Fukui, K., Taguchi, M.: 2008, A 2-m class Telescope at Dome Fuji, EAS Publications Ser. 33, 271.

Takeda, Y.: 2008, On the determination of stellar parameters and abundances of metal-rich stars, The Metal-Rich Universe, Eds.

G. Israelian, G. Meynet, 308-320.

Takeda, Y., **Kawanomoto, S.**, **Ohishi, N.**: 2008, Rotational feature of Vega and its impact on abundance determinations, Proc. of CP#AP Workshop 2007 (Contr. Astron. Obs. Skalnate Pleso Vol. 38, No. 2), Eds. J. Ziznovsky, J. Zverko, E. Paunzen, M. Netopil, 157-162.

Tamura, N., Sharples, R. M., **Arimoto, N.**, Onodera, M., Ohta, K., **Yamada, Y.**: 2008, A Subaru/Suprime-Cam Wide-Filed Survey of Globular Cluster Populations Surrounding M87, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 457.

Tamura, N., Sharples, R.M., **Arimoto, N.**, Onodera, M., Ohta, K., **Yamada, Y.**: 2009, A Subaru/Suprime-Cam Wide-Filed Survey of Globular Cluster Populations around M87, Globular Clusters - Guides to Galaxies, Eso Astrophysics Symposia, Eds. J. Th. van Loon, J. M. Oliveira, 208.

Tanaka, M., Chiba, M., **Komiyama, Y.**, Guhathakurta, P., **Iye, M.**: 2008, A Panoramic View of the Stellar Halo in My Neighbor Andromeda: A Metal Poor Halo Emerges in the North-West Fields , Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 479-480.

Tanaka, M., **Shirasaki, Y.**, **Ohishi, M.**, **Mizumoto, Y.**, Ishihara, Y., Tsutsumi, J., Machida, Y., Nakamoto, H., Kobayashi, Y., Sakamoto, M.: 2008, Construction of Multiple-Catalog Database for JVO, Astronomical Data Analysis Software and Systems XVII (ASP Conf. Ser. 394), Eds. R. W. Argyle, P. S. Bunclark, J. R. Lewis, 261-264.

Tatsuda, S., et al. including **Kajino, T.**: 2008, Fission modes of neutron-rich nuclei in the *r*-process nucleosynthesis, AIP Conf. Proc. 1016, Eds. T. Suda, et al., 469-471.

Terada, H., Ikeda, Y., Kobayashi, N., Yasui, C., **Pyo, T-S.**, **Usuda, T.**, **Hayashi, M.**, Kawakita, H.: 2008, High Resolution spectrograph unit (HRU) for the SUBARU/IRCS, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 701434-1-10.

Teriaca, L., Wiegelmann, T., Lagg, A., Solanki, S. K., Curdt, W., **Sekii, T.**: 2008, Loop Morphology and Flows and their Relation to the Magnetic Field, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 196.

Tokoku, C., et al. including **Suzuki, R.Kajisawa, M.**, **Tanaka, I.**, **Konishi, M.**,: 2008, Search for Galaxies at the Cosmic Frontier, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 65.

Tosaki, T., Miura, R., **Sawada, T.**, **Kuno, N.**, **Nakanishi, K.**, Kohno, K., **Okumura, S. K.**, **Komugi, S.**, **Tamura, Y.**, **Kawabe, R.**: 2008, NRO 45 M and ASTE 10 M Observations of Dense Gas in Giant HII Regions of M 33, EAS Publication Series 31, Far-Infrared Workshop 2007, Eds. C. Kramer, S. Aalto R. Simon, 211-212.

Tsujimoto, T.: 2008, Evidence of outflow from the Galactic bulge imprinted in stellar elemental abundances, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 369-370.

Tsujimoto, T.: 2008, A New Picture of the Bulge-Disk Connection Imprinted in Elemental Abundances of Metal Rich Disk Stars, Formation and Evolution of Galaxy Disks (ASP Conf. Ser. 396), Eds. J. G. Funes, E. M. Corsini, 165.

Tsujimoto, T., Bland-Hawthorn, J., Freeman, K. C.: 2009, Chemical Evolution of the Galaxy disk in connection with large-scale winds, Proc. of the IAU Symp. 254, Eds. J. Andersen, J. Bland-Hawthorn, B. Nordstrom, 393-398.

Tsujimoto, T., Kobayashi, N., Yasui, C., Kondo, S., Minami, A., Motohara, K., Ikeda, Y., **Gouda, N.**: 2008, Development of a near-infrared high-resolution spectrograph (WINERED) for a survey of bulge stars, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 510-511.

Tsuneta, S.: 2008, The *Hinode* Mission, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 3.

Tsuneta, S.: 2008, Magnetic Fields in the Solar Polar Region, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 19.

Uchida, T., Miyatake, H., **Nakaya, H.**, Aihara, H., **Miyazaki, S.**: 2008, Hyper Suprime-Cam: back-end electronics for CCD readout, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70146K.

Uchimoto, Y. K., et al. including **Suzuki, R.**, **Omata, K.**, **Nishimura, T.**, **Tanaka, I.**: 2008, Subaru/MOIRCS Near-Infrared Imaging in the Proto-Cluster Region at z=3.1, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 373.

Ueta, T., Matsunaga, N., **Ita, Y.**: 2009, AGB Stars and Related Phenomena, AGB Stars and Related Phenomena, Eds. T. Ueta, N. Matsunaga, Y. Ita.

Ukita, N.: 2008, Wind induced surface deformation of the Nobeyama 45-m radio telescope, SPIE 7012, Eds. L. M. Stepp, R. Gilmozzi, 70120V.

Ukita, N.: 2009, Submillimeter Molecular Line Observations of Binary (Post-) AGB Stars, AGB Stars and Related Phenomena, Eds. T. Ueta, N. Matsunaga, Y. Ita, 68.

Uraguchi, F., **Takato, N.**, **Iwata, I.**, **Koyano, S.**, **Mikami, Y.**: 2008, First results from turbulence profiling with SODAR at Subaru Telescope, SPIE 7012, Eds. L. M. Stepp, R. Gilmozzi, 70123X.

Uzawa, Y., Kojima, T., **Kroug, M.**, **Fujii, Y.**, **Candotti, M.**, Shan, W. L., Takeda, M., **Kaneko, K.**, **Shitov, S.**, Wang, M. J.: 2008, Development of the 787-950 GHz ALMA Band 10 Cartidge, IRMMW-THz 2008, 1566.

Valenti, S., et al. including **Iye, M.**: 2008, BVRI light curves of SN 2003jd (Valenti+, 2008), 2008yCat83831485.

Vondrak, J., et al. including **Fukushima, T.**: 2008, Report on Division I: Fundamental Astronomy, Trans. IAU 27A, Ed. K. van der Hucht, 1-4.

Vystavkin, A. N., et al. including **Shitov, S. V.**: 2008, Development of high-sensitive 1.2 mm imaging radiometer with two-polarization antenna-coupled TES-bolometer array for ground-based 6-m optical telescope, SPIE 7020, Eds. W. D. Duncan, W. S. Holland, 702024.

Wada, T., et al. including **Ita, Y.**: 2008, The Infrared Camera (IRC) for AKARI: in-flight imaging performance and the post cryogen mission, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 10.

Wang, S.-Y., Liaw, E. J.-Y., Huang, Y.-D., Chiu, C.-F., Jeng, D.-Z., **Doi, Y.**, **Uragachi, F.**, **Komiyama, Y.**, **Miyazaki, S.**: 2008, The shutter and filter exchange system of Hyper Suprime-Cam, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 70144A.

Watanabe, M., **Oya, S.**, **Hayano, Y.**, **Takami, H.**, **Hattori, M.**, **Minowa, Y.**, **Saito, Y.**, **Ito, M.**, **Murakami, N.**, **Iye, M.**, **Guyon, O.**, **Colley, S.**, **Eldred, M.**, **Golota, T.**, **Dinkins, M.**: 2008, Implementation of 188-element curvature-based wavefront sensor and calibration source unit for the Subaru LGSAO system, SPIE 7015, Eds. N. Hubin, C. E. Max, P. L. Wizinowich, 701564-1-8.

Watanabe, T.: 2008, Fine structures of flaring loops seen in Fe XIII 263.76 A line, First Results from *Hinode* (ASP Conf. Ser. 397), Eds. S. A. Mattews, J. M. Davis, L. K. Harra, 139.

Watanabe, J., Honda, M., **Ishiguro, M.**, Ootsubo, T., Sakon, I., Ishihara, D., Shimonishi, T., **Fujiyoshi, T.**, **Fuse, T.**, **Takato, N.**, Kadono, T., **Furusho, R.**: 2008, Subaru/COMICS Mid-Infrared Observation of Near-Nucleus Region of Comet 17P/Holmes at the Early Phase of the Outburst, Asteroids, Comets, Meteors 2008.

Witt, A. N., et al. including **Watanabe, J.**: 2008, Commission 21: Light of the Night Sky, Trans. IAU 27A, Ed. K. van der Hucht, 171-173.

Yabe, K., Ohta, K., **Iwata, I.**, Sawicki, M., **Tamura, N.**, Akiyama, M., **Aoki, K.**: 2008, The Stellar Populations of Lyman-Break Galaxies at *z*~5, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 205.

Yamada, Y., **Arimoto, N.**, Vazdekis, A., Peletier, R. F.: 2008, Stellar Populations of Nearby Elliptical Galaxies, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 326.

Yamada, Y., **Gouda, N.**, **Yano, T.**, **Kobayashi, Y.**, Niwa, Y.: 2008, JASMINE data analysis, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 407-408.

Yamada, Y., **Gouda, N.**, **Yano, T.**, **Kobayashi, Y.**, Niwa, Y.: 2008, JASMINE design and method of data reduction, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 419-420.

Yamauchi, M., **Gouda, N.**, **Kobayashi, Y.**, **Tsujimoto, T.**, **Yano, T.**, Suganuma, M., Yamada, Y., Najasuka, S., Sako, N.: 2008, A Star Image Extractor for the Nano-JASMINE Satellite, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 294-295.

Yamazaki D. G., Ichiki K., **Kajino T.**, Mathews. G. J.: 2008, Effects of Primordial Magnetic Field on Early Universe, *Modern Physics Letters A*, **23**, 1695-1706.

Yamazaki D. G., Ichiki K., **Kajino K.**, Mathews G. J.: 2008, A Strong Constraint on the Neutrino Mass from the Formation of Large Scale Structure in the Presence of the Primordial Magnetic Field, Proc. of the Int. Symp. on Nuclear Astrophysics - Nuclei in the Cosmos - X, Eds. H. Schatz, et al., 239.

Yanagisawa, K., **Okita, K.**, **Shimizu, Y.**, **Otsuka, M.**, **Nagayama, S.**, **Iwata, I.**, **Ozaki, S.**, **Yoshida, M.**, **Nakaya, H.**, **Tajitsu, A.**, Okumura, S-I., Yamamuro, T.: 2008, ISLE: near-infrared imager/spectrograph for the 1.88m Telescope at Okayama Astrophysical Observatory, SPIE 7014, Eds. I. S. McLean, M. M. Casali, 106-109.

Yano, T., **Gouda, N.**, **Kobayashi, Y.**, Yamada, Y., **Tsujimoto, T.**, Suganuma, M., Niwa, Y., Yamauchi, M.: 2008, Space Astrometry JASMINE, Proc. of the IAU Symp. 248, Eds. W. J. Jin, I. Platais, M. A. C. Perryman, 296-297.

Yano, T., **Gouda, N.**, Ueda, H., Koyama, H., Kan-Ya, Y., Taruya, A.: 2008, Elucidation of kinematical and dynamical structure of the Galactic bulge, Proc. of the IAU Symp. 245, Eds. M. Bureau, E. Athanassoula, B. Barbuy, 39-40.

Yasui, C., Kobayashi, N., Tokunaga, A. T., **Saito, M.**: 2008, Extreme Outer Galaxy: A Laboratory of Star Formation in an Early Epoch of the Galaxy's Formation, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 481.

Yasui, C., Kobayashi, N., Tokunaga, A. T., **Saito, M.**, Tokoku, C.: 2008, Star Formation in the Extreme Outer Galaxy: the Initial Mass Function in a Low Metallicity Environment, Formation and Evolution of Galaxy Disks (ASP Conf. Ser. 396), Eds. J. G. Funes, E. M. Corsini, 225.

Yoshida, M., Shimasaku, K., Okamura, S., **Sekiguchi, K.**, **Furusawa, H.**, Ouchi, M.: 2008, Dependence of Clustering Strength on Stellar Mass and SFR for LBGs at *z*~3, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 276.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB 080604: MITSuME Okayama observation., GRB Coordinates Network, Circular Service, 7821, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB080605: optical observation with the MITSuME-OAO telescope, GRB Coordinates Network, Circular Service, 7863, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB080613A: optical upper limits with Okayama MITSuME telescope, GRB Coordinates Network, Circular Service, 7885, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB080613B: MITSuME upper limits, GRB Coordinates Network, Circular Service, 7886, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB 080710: optical observation with MITSuME okayama, GRB Coordinates Network, Circular Service, 7973, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2009, GRB 090313: MITSuME Okayama observation, GRB Coordinates Network, Circular Service, 9002, 1.

Yoshida, M., **Yanagisawa, K.**, **Kuroda, D.**, **Shimizu, Y.**, **Nagayama, S.**, **Toda, H.**, Kawai, N.: 2008, GRB080810: MITSuME optical observation, GRB Coordinates Network, Circular Service, 8097, 1.

Yoshida, M., **Yanagisawa, K.**, **Shimizu, Y.**, **Okita, K.**, **Nagayama, S.**, **Toda, H.**, Ohta, K., Kawai, N.: 2008, OAOWFC: Okayama Astrophysical Observatory NIR Wide-Field Camera, AIP Conf. Proc. 1000, 596-599.

Yoshida, T.: 2008, Supernova Mixing to Reproduce Isotopic Ratios of Presolar Grains, Proc. of the Int. Symp. on Nuclear Astrophysics

- Nuclei in the Cosmos - X, Eds. H. Schatz, et al., 22.
Yoshida, T., Umeda, H., Nomoto, K.: 2008, *ν*-Process in Population III Core-Collapse Supernovae, Proc. of the Int. Symp. on Nuclear Astrophysics - Nuclei in the Cosmos - X, Eds. H. Schatz, et al., 127.
Yoshikawa, T., Akiyama, M., Ichikawa, T., **Kajisawa, M.**, **Konishi, M.**, Yamada, T., **Suzuki, R.**, Tokoku, C., Uchimoto, Y. K., **Tanaka, I.**, **Omata, K.**, **Nishimura, T.**: 2008, Rest-Optical Spectroscopic Properties of Luminous Infrared Galaxies at $z\sim 2$, Panoramic Views of Galaxy Formation and Evolution (ASP Conf. Ser. 399), Eds. T. Kodama, T. Yamada, K. Aoki, 214.
Zubko, N., Baba, N., **Murakami, N.**: 2008, Polarization analysis as a means of detecting exoplanets and measuring their objective spectra, SPIE 7010, Eds. Jr. J. M., Oschmann, M. W. M., de Graauw, H. A. MacEwen, 70101P-1.

5. Publications in English

Kato, D., et al. including **Nakaya, H.**, **Tamura, M.**, **Ita, Y.**: 2008, IRSF Magellanic Clouds Point Source Catalog (Kato+ 2007), VizieR Online Data Catalog.
Kodama, T., Yamada, T., **Aoki, K.**: 2008, Panoramic Views of Galaxy Formation and Evolution, ASP Conf. Ser. 399, USA.
Meyer, M. R., et al. including **Kandori, R.**: 2008, Star Formation in NGC 2023, NGC 2024, and Southern L1630, in "Handbook of Star Forming Regions, Vol. I The Northern Sky", ASP, USA.
Mortier, A. M., et al. including **Sekiguchi, K.**: 2008, Short Title (Mortier+, 2005), VizieR Online Data Catalog.
Takeuchi, T., Wyatt, M., Nakamura, A. M., Michel, P., Abe, S., Li, A., Mann, I., **Ishiguro, M.**, Ueno, M., Jewitt, D., Itoh, Y.: 2008, Small Bodies in Planetary Systems (Lecture Notes in Physics), Springer, Berlin / Heidelberg.

6. Conference Presentations

Agata, H.: 2008, “You are also Galileo” Project, Int. Workshop on New Astronomical Facilities in Peru, (Instituto Geofisico del Peru, Lima, Peru, July 1, 2008).
Agata, H.: 2008, “You are also Galileo” Project - Produced by the IYA Japan, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).
Agata, H.: 2008, Astronomical Education and Public Outreach in Japan, Int. Workshop on New Astronomical Facilities in Peru, (Instituto Geofisico del Peru, Lima, Peru, July 1st, 2008).
Agata, H.: 2008, Introduction to the New Public Understanding of Research Experiments in Japan, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).
Agata, H.: 2008, Science Education Goals:Japanese’s Perspective, Building New Global Science Education Systems for a New World, (The University of Hong Kong, Hong Kong, May 7, 2008).
Agata, H.: 2008, Telescopes for children, Building New Global Science Education Systems for a New World, (The University of Hong Kong, Hong Kong, May 7, 2008).
Agata, H.: 2009, “You are also Galileo” Project - Produced by the IYA Japan, Meeting on Developing a Global Science Education Network, (Institute of Astrophysics, Paris, France, Jan. 27, 2009).
Agata, H.: 2009, Introduction to the New Public Understanding of Research Experiments in Japan, Meeting on Developing a Global Science Education Network, (Institute of Astrophysics, Paris, France, Jan. 27, 2009).
Akitaya, H., Ikeda, Y., Kawabata, K. S., Matsuda, K., Okazaki, A., Seki, M.: 2008, Echelle spectro-polarimetry of T Tauri Star RY Tauri, Astronomical Polarimetry 2008, (La Malbaie, Quebec, Canada, Jul. 6-11, 2008).
Aoki, W.: 2009, High resolution optical spectroscopy with the Subaru Telescope, SPECTRA 2009: Conf. on Spectroscopy and its Applications, (Lima, Peru, Mar 9-13, 2009).
Arai, K., Miyakawa, O.: 2009, Status of Japanese Projects, March LSC-Virgo Meeting, (Arcadia, California, USA, Mar 16-19, 2009).
Arai, K.: 2009, Current status of Japanese gravitational wave detectors, GWDAW 13, (San Juan, Puerto Rico, Jan. 19-22, 2009).
Arai, T., Yamamoto, Y., Okada, T., Kato, M.: 2009, Lessons Learned in Onboard Software Processing of XRS-Kaguya, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).
Araki, H., **Ishihara, Y.**, **Noda, H.**, **Goossens, S.**, **Tazawa, S.**, **Kawano, N.**, **Sasaki, S.**, Oberst, J., Shum, C. K.: 2008, A New Lunar Topographic Map of the Moon by KAGUYA-LALT: The First Precise Topography of the Polar Regions, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).
Araki, H., **Ishihara, Y.**, **Noda, H.**, **Goossens, S.**, **Tazawa, S.**, **Kawano, N.**, **Sasaki, S.**, Oberst, J., Shum, C. K.: 2009, Lunar Global Topographic Map Derived from the LALT Altimetry: The first year’s results, The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).
Araki, H., **Sasaki, S.**, **Noda, H.**, **Tazawa, S.**, **Ishihara, Y.**, Migita, E., **Kawano, N.**, Kamiya, I., Oberst, J.: 2008, Global Lunar Topography by LALT (Laser Altimeter) on Board Kaguya, 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).
Araki, H., **Tazawa, S.**, **Noda, H.**, **Ishihara, Y.**, **Goossens, S.**, **Kawano, N.**, **Sasaki, S.**, Kamiya, I., Otake, H., Oberst, J., Shum, C. K.: 2009, The First Lunar Global Topography by the Laser Altimeter (LALT) on the KAGUYA (SELENE) Main Orbiter, 1st Int. Conf. on Space Optical Systems and Applications, (Tokyo, Japan, Feb. 4-6, 2009).
Araki, H., **Tazawa, S.**, **Noda, H.**, **Ishihara, Y.**, **Goossens, S.**, **Kawano, N.**, **Sasaki, S.**, Kamiya, I., Otake, H., Oberst, J., Shum, C. K.: 2009, The Lunar Global Topography by the Laser Altimeter (LALT) onboard KAGUYA (SELENE): Results from One Year Observation, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).
Araki, H., **Tazawa, S.**, **Noda, H.**, Migita, E., **Ishihara, Y.**, **Kawano, N.**, **Sasaki, S.**, Tsubokawa, T., Kamiya I., Kunimori, H., Oberst, J., Shum, C. K.: 2008, Initial Results of the Lunar Laser Topography by KAGUYA-LALT Mission, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).
Araki, H., **Tazawa, S.**, **Noda, H.**, Migita, E., Kamiya, I., **Kawano, N.**, **Sasaki, S.**: 2008, Preliminary results of the Lunar topography by Kaguya-LALT misssion, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Asayama, S., **Kawashima, S.**, **Iwashita, H.**, **Inata, M.**, **Obuchi, Y.**, **Suzuki, T.**, **Wada, T.**: 2008, Design and Development of ALMA Band 4 Cartridge Receiver, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Bukovski, M. A., **Shitov, S. V.**, Uvarov, A. V., Koryukin, O. V., **Uzawa, Y.**: 2008, SIS mixers for ALMA band-10: comparison of epitaxial and hybrid circuits, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Candotti, M., et al.: 2008, Status of the ALMA band 10 front-end optics development, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Candotti, M., **Uzawa, Y.**, **Fujii, Y.**, **Shitov, S.**, **Kaneko, K.**: 2008, Electromagnetic characterization of direct machined corrugated horn for the ALMA band 10 receiver, 2008 Int. Symp. on Antenna and Propagation, (Taipei, Taiwan, Oct. 27-30, 2008).

Candotti, M., **Uzawa, Y.**, **Shitov, S. V.**, **Fujii, Y.**, **Kaneko, K.**: 2008, Tolerance analysis of the ALMA band 10 front-end optics, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Endo, A., **Noguchi, T.**, **Kroug, M.**, **Shitov, S. V.**, Shan, W., **Tamura, T.**, **Kojima, T.**, **Uzawa, Y.**, **Sakai, T.**, Inoue, H., Kohno, K.: 2008, A novel THz SIS mixer with a NbTiN-ground plane and SIS micro-trilayers directly grown on a quartz substrate, Applied Superconductivity Conf., (Chicago, USA, Aug. 17-22, 2008).

Endo, A., **Noguchi, T.**, **Kroug, M.**, **Shitov, S. V.**, Shan, W., **Tamura, T.**, **Kojima, T.**, **Uzawa, Y.**, **Sakai, T.**, Inoue, H., **Muraoka, K.**, Kohno, K.: 2008, A novel THz SIS mixer with a NbTiN-groundplane and SIS micro-trilayers directly grown on a quartz substrate, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Fujii, M.: 2008, Trojan Stars in the Galactic Center, Back to the Galaxy II, (Santa Barbara, USA, Sep. 29-Oct. 3, 2008).

Fujii, M.: 2009, *N*-body Simulation of Star Clusters near the Galactic Center using BRIDGE, Formation and Evolution of Globular Clusters, (Santa Barbara, USA, Jan. 12-16, 2009).

Fujii, Y., et al.: 2008, Measurement system of ALMA/Band10 cartridge, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Fujimura, D.: 2008, Discovery of Magneto-Hydrodynamic Waves at Solar Photosphere, The 2nd Hinode Science Meeting – Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Fujiwara, M., Sasaki, M., Nagata, H., **Matsuo, H.**: 2008, Optical control of low frequency noise behavior in cryogenic GaAs junction field effect transistor, 8th Int. Workshop on Low Temperature Electronics, (Jena/Gabelbach, Germany, Jun. 22-25, 2008).

Furusho, R., Arai, A., Uemura, M., Kawabata, K. S., Sasada, M., **Yamashita, T.**, Ohsugi, S., Sato, S., **Kino, M.**, Kato, H., **Watanabe, J.**: 2008, Polarimetry of 17P/Holmes, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Goossens, S., **Matsumoto, K.**, **Ishihara, Y.**, **Liu, Q.**, **Kikuchi, F.**, **Noda, H.**, **Iwata, T.**, Namiki, N., **Hanada, H.**: 2008, Analysis of tracking data and results from Kaguya (SELENE) satellites for lunar gravity field estimation, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Goossens, S., **Matsumoto, K.**, **Ishihara, Y.**, **Liu, Q.**, **Kikuchi, F.**, **Noda, H.**, Namiki, N., **Iwata, T.**: 2008, Orbit determination and quality assessment using SELENE tracking data and results, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Goossens, S., **Matsumoto, K.**, **Noda, H.**: 2009, Precise orbit determination of the main satel; lite of Kaguya, The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Guyon, O.: 2008, Adaptive Optics System Design, CfAO summer school, (Santa Cruz, CA, USA, Aug. 4-8, 2008).

Guyon, O.: 2008, The Pupil mapping Exoplanet Coronagraphic Observer (PECO), AIAA meeting, (San Diego, CA, USA, Sept. 9-11, 2008).

Guyon, O.: 2009, Coronagraphy review, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Guyon, O.: 2009, Imaging and Characterizing the Habitable Zones of nearby Planetary Systems with the Pupil mapping Exoplanet Coronagraphic Observer (PECO), AAS meeting, (Long Beach, CA, USA, Jan. 5-8, 2009).

Guyon, O.: 2009, Key technologies for the Pupil mapping Exoplanet Coronagraphic Observer (PECO), AAS meeting, (Long Beach, CA, USA, Jan. 5-8, 2009).

Guyon, O.: 2009, The Pupil mapping Exoplanet Coronagraphic Observer (PECO), Beyond JWST, (Baltimore, Maryland, USA, Mar. 26-27, 2009).

Hagiwara, Y.: 2008, AGN Maser, Scientific Symp.: Activity in Extragalactic Objects, (MPIfR, Bonn, Germany, Oct. 16-17, 2008).

Hagiwara, Y.: 2008, Water Megamaser Observations with Space-VLBI, Radio Universe at Ultimate Angular Resolution, (Astro-Space Center, Moscow, Russia, Oct. 20-24, 2008).

Hagiwara, Y.: 2009, VSOP-2 Key Science Proposal, Korean VLBI Network Internal Workshop, (Ringberg, Germany, Feb. 13, 2009).

Hamana, T.: 2008, HSC weak lensing survey, Taiwan-Japan Subaru-HSC Science/Survey Mini Workshop, (ASIAA, Taipei, Taiwan, Dec. 22, 2008).

Hamana, T.: 2008, Subaru weak lensing survey and Hyper SuprimeCam, DENET summer school: Dark Energy in the Universe, (Aomori, Japan, Sep. 1-4, 2008).

Hamana, T.: 2009, Reports from activities so far ongoing in Japan, Japan-Princeton-Taiwan HSC Workshop, (Mitaka, Japan, Jan. 17-20, 2009).

Hanada, H., et al. including **Kawano, N.**, **Sasaki, S.**, **Matsumoto, K.**, **Noda, H.**, **Tsuruta, S.**, **Asari, K.**, **Ishikawa, T.**, **Kikuchi, F.**, **Liu, Q.**, **Goossens, S.**, **Ishihara, Y.**: 2008, Exploration of Lunar Gravity by VLBI Observations of SELENE (KAGUYA), The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Hanada, H., et al. including **Liu, Q.**, **Kikuchi, F.**, **Matsumoto, K.**, **Ishihara, Y.**, **Kawano, N.**, **Asari, K.**, **Noda, H.**, **Ishikawa, T.**, **Tsuruta, S.**, **Goossens, S.**, **Sasaki, S.**: 2008, VLBI Observation of Okina and Ouna in Kaguya (SELENE) for Improvement of Orbit Determination and Lunar Gravity Field Model, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Hanada, H., **Iwata, T.**, **Sasaki, S.**, **Kawano, N.**, **Araki, H.**, **Noda, H.**:

2008, Lunar Observatory in a future Lunar Mission, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Hanada, H., VRAD team: 2009, VRAD: Scientific Results and Current Status, The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Hanaoka, Y.: 2008, Spectropolarimetry with the Hide Domeless Solar Telescope, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Hanaoka, Y.: 2008, Spectropolarimetry with the Hide Domeless Solar Telescope, Int. Workshop of 2008 Solar Total Eclipse, (Jiuquan, Gansu, China, Jul. 28-Aug. 5, 2008).

Hanayama, H.: 2008, Biermann Mechanism and Seed Magnetic Fields from Primordial Supernova Remnant, East Asian Young Astronomers Meeting 2008, (Jiayuguan, China, Sep. 27-Aug. 1, 2008).

Hanayama, H.: 2008, Biermann Mechanism in Primordial Supernova Remnant and Seed Magnetic Fields, New Vision 400, (Beijing, China, Oct. 12-15, 2008).

Hara, H.: 2008, Coronal Plasma Motions in Active Region Loops Observed with Hinode EIS, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Hara, H.: 2008, Coronal Plasma Motions near Footpoints of Active Region Loops, Int. Workshop of 2008 Solar Total Eclipse, (Jiuquan, Gansu, China, Jul. 28-Aug. 5, 2008).

Hara, H.: 2008, Coronal Plasma Motions near Footpoints of Active Region Loops Revealed from Spectroscopic Observations with it Hinode EIS, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Hara, H.: 2008, Differential Rotation Rate of the Solar Corona Estimated From X-Ray Bright Points, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Hara, H.: 2008, Plan-A Mission description, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Harada, Y.: 2008, True Polar Wander Due to Surface Mass Loading on Mars: Implication to Evolution of the Tharsis Province, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Harada, Y.: 2008, True Polar Wander Due to Surface Mass Loading on Mars: Implication to Evolution of the Tharsis Province, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Harada, Y.: 2008, True Polar Wander Due to Surface Mass Loading: Interaction between Rotation and Deformation through Pole Tide, EGU, (Vienna, Austria, Apr. 13-18, 2008).

Hasegawa, T., Fukuda, Y., Yamamoto, K., Nakaegawa, T., **Tamura, Y.**: 2008, 2006 Australian drought detected by GRACE, IAG Int. Symp. on Gravity, Geoid and Earth Observation 2008, (Technical University of Grete, Greece, June 23-27, 2008).

Hasegawa, T.: 2008, ALMA Construction Status and Operation Planning, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Hashimoto, J., **Tamura, M.**, **Kandori, R.**, **Kusakabe, N.**, **Nakajima, Y.**, Kurita, M., Nagata, T., Nagayama, T., Hough, J., Chrysostomou, A.: 2008, Wide-Field Near-Infrared Polarimetry of Star Forming Regions: A Nest of Infrared Reflection Nebulae in the NGC 6334 Region, Astronomical Polarimetry 2008, (La Malbaie, Quebec, Canada, Jul. 6-11, 2008).

Hashimoto, J.: 2009, Polarimetry for the Disks around Young Brown Dwarfs, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Hashimoto, T., **Watanabe, J.**, **Sato, M.**: 2008, Optical Observation of Northern Toroidal Source, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Hatsutori, Y., Nakasuka, S.: 2008, A Study on Vibration Isolator for Reaction Wheel Assembly, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Hatsutori, Y., Suganuma, M., **Kobayashi, Y.**, **Gouda, N.**, **Yano, T.**, Yamada, Y., Yamauchi, M.: 2008, A Very Small Astrometry Satellite, Nano-JASMINE: Its Telescope and Mission Goal, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Hibi, Y., **Matsuo, H.**, Arai, H., Nagata, H., Ikeda, H., Fujiwara, M.: 2008, The cryogenic multiplexer and shift register for submillimeter-wave digital camera, 8th Int. Workshop on Low Temperature Electronics, (Jena/Gabelbach, Germany, Jun. 22-25, 2008).

Higuchi, A.: 2008, Evolution of the Oort cloud by stellar encounters, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Higuchi, A.: 2008, Formation of the Oort cloud by stellar encounters, EPSC 2008: European Planetary Science Congress, (Münster, Germany, Sep. 21-26, 2008).

Hirai, T., Ohashi, H., **Sasaki, S.**, Shibata, H., Nogami, K., Iwai, T.: 2008, Development of a Light-Weight, Large Area In-Situ Impact Ionization Dust/Debris Detector, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Hirata, N., Abe, S., Ishiguro, M., Kitazato, K., Nakamura, R., Miyamoto, H., Demura, H., Abe, M., **Sasaki, S.**: 2008, Geologic Processes on the Surface of a Small Asteroid Itokawa, 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).

Hara, H.: 2009, Magnetic Activity on the Sun Revealed by *Hinode*, US Japan Mini-Workshop on Magnetic Reconnection, (Princeton, USA, Mar. 2, 2009).

Hiroi, T., Abe, M., Nimura, T., Kitazato, K., Abe, S., Takagi, Y., **Sasaki, S.**, Ishiguro, M.: 2008, Danger in Interpreting the 2-Micron Band of Reflectance Spectra of Small Asteroids: A Lesson from Hayabusa/NIRS Data of Itokawa, 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).

Hirota, T.: 2008, Proposal Writing and Observation Planning, 2nd Asian Radio Astronomy School, (ASIAA, Taipei, Taiwan, Aug. 18-22, 2008).

Hirota, T.: 2008, Relationship between the H_2O and CH_3OH masers, East Asia VLBI Mini-Workshop; Science of the methanol maser, (Shanghai, China, Nov. 25-26, 2008).

Hirota, T.: 2009, Observational Studies on Dark Cloud Cores in the Early Evolutionary Stage, 2nd Tokyo-NRO Workshop Chemical Diagnostics of Star and Planet Formation, (Univ. of Tokyo, Tokyo, Japan, Mar. 5-6, 2009).

Hirota, T.: 2009, Report on the Second Asian Radio Astronomy School, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Hong, S. S., Pyo, J., Ueno, M., Kwon, S. M., **Ishiguro, M.**, Usui, F., Ootsubo, T., Ishihara, D., Mukai, T.: 2009, Modeling of the Interplanetary Dust Cloud, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Honma, M.: 2008, Methanol Maser Observations with VERA, East Asia VLBI Mini-Workshop; Science of the methanol maser, (Shanghai, China, Nov. 25-26, 2008).

Honma, M.: 2008, Observations of AGB stars with VERA, AGB stars and related phenomena, (Mitaka, Japan, Nov. 12-14, 2009).

Hosokawa, T.: 2008, Evolution of Massive Protostars with High Accretion Rates, Early Phase of Starformation 2008, (Ringberg, Germany, July 28-Aug.1, 2008).

Imada, S.: 2008, Solar wind acceleration, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Imada, S.: 2008, Non-Gaussian line profiles associated with flows in a large solar flare, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Imamura, T., **Iwata, T.**, Yamamoto, Z., Mochizuki, N., Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, **Hanada, H.**, Oyama, K., Futaana, Y., Nabatov, A., Saitou, A., Ando, H.: 2009, Observation of the Lunar Ionosphere with SELENE Radio Science Experiment, The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Imamura, T., **Iwata, T.**, Yamamoto, Z., Mochizuki, N., Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, **Hanada, H.**, Oyama, K., Futaana, Y., Nabatov, A., Saitou, A., Andou, H.: 2008, Studying the Lunar Ionosphere with SELENE Radio Science Experiment, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Imamura, T., **Iwata, T.**, Yamamoto, Z., Oyama, K.-I., Nabatov, A., Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, **Hanada, H.**, Futaana, Y., Saito, A.: 2008, Initial Results of the Lunar Ionosphere Observation with SELENE Radio Science, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Imamura, T., Oyama, K., **Iwata, T.**, Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, Futaana, Y., Nabatov, A.: 2008, Studying the lunar ionosphere with the SELENE radio science experiment, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Imanishi, M.: 2008, Luminous buried AGNs in luminous IR galaxies and the origin of galaxy downsizing, The Central Kiloparsec Active Galactic Nuclei and Their Hosts, (Ierapetra, Crete, Greece, June 4-6, 2008).

Imanishi, M.: 2008, Luminous Buried AGNs in the local universe (Subaru, Spitzer, AKARI, NRO), The Starburst-AGN Connection Conf., (Shanghai, China, Oct. 27-31, 2008).

Imanishi, M.: 2008, Molecular gas diagnostics of nearby LIRGs with ASTE WHSF, ASTE Science Workshop, (Mitaka, Japan, Dec. 11-12, 2008).

Imanishi, M.: 2008, Nobeyama millimeter interferometric 3D observations of high density molecular gas in luminous infrared galaxies, Gas and Stars in Galaxies - A Multi-Wavelength 3D Perspective, (Garching, Germany, June 10-13, 2008).

Imanishi, M.: 2009, Astronomical Science Results of the Subaru Telescope: Infrared Spectroscopy, SPECTRA 2009: Conf. on Spectroscopy and its Applications, (Lima, Peru, Mar 9-13, 2009).

Imanishi, M.: 2009, Luminous buried AGNs in nearby ultra-luminous infrared galaxies, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Imanishi, Y., **Tamura, Y.**, Ikeda, H., Okubo, S.: 2008, Permanent gravity changes caused by The 2007 Noto Hantou Earthquake and The 2007 Niigataken Chuetsu-oki Earthquake recorded by superconducting gravimeters, Earth Tides Symp. 2008, IAG, (Jena, Germany, Sep. 1-5, 2008).

Inamori, T., Sako, N., Casey, L., **Hatsutori, Y.**, Nakasuka, S.: 2008, Method to control nano-satellite attitude using star blurred and skewed images, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Inoue, H., **Noguchi, T.**: 2008, Noise source using SIS junction, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Inoue, S., **Magara, T.**, **Takahashi, K.**, Miyagoshi, T.: 2008, Numerical Reconstruction of Sigmoidal Structure Associated with Flux Emergence of the Sun, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Inoue, T.: 2008, Turbulence and Magnetic Field Amplification in Supernova Remunant, Astrophysical Jet, (Nagoya, Japan, Oct. 4, 2008).

Ishiguro, M., Sarugaku, Y., Ueno, M.: 2008, Interplanetary Dust Particles from Jupiter-Family Comets, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ishiguro, M., Sarugaku, Y., Urakawa, S., Usui, F., Ueno, M.: 2008, Optical Observations of Dust Trails and the Meteoric Connection, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ishiguro, M., Usui, F., Sarugaku, Y., Ishihara, D., Ootsubo, T., Ueno, M.: 2009, Optical and Infrared Observations of Comet 4P/Faye in 2006 Return, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Ishihara, Y., **Araki, H.**, **Noda, H.**, **Tazawa, S.**, Migita, E., **Kawano, N.**, **Sasaki, S.**: 2008, A preliminary lunar topographic model by KAGUYA/LALT, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ishihara, Y., **Goossens, S.**, **Matsumoto, K.**, Namiki, N., **Noda, H.**, **Araki, H.**, **Hanada, H.**, **Iwata, T.**, **Tazawa, S.**, **Sasaki, S.**, RSAT/VRAD Mission Team, LALT Mission Team: 2009, Developing the Lunar Moho Depth Model from Selenodetic Data of SELENE (Kaguya), The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Ishihara, Y., **Matsumoto, K.**, **Goossens, S.**, **Araki, H.**, Namiki, N., **Hanada, H.**, **Iwata, T.**, **Noda, H.**, **Sasaki, S.**: 2008, Localized gravity/topography correlation spectra on the moon, 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).

Ishihara, Y., Namiki, N., **Hanada, H.**, **Araki, H.**, **Iwata, T.**, **Matsumoto, K.**, **Noda, H.**, **Goossens, S.**, **Tazawa, S.**, **Sasaki, S.**, Ogawa, M., RSAT/VRAD team, LALT team: 2008, Current Results of Selenodetic Observation of KAGUYA, 7th General Assemby of Asian Seismological Commission and Seismological Society of Japan, 2008 Fall meeting, (Tsukuba, Japan, Nov. 24-27, 2008).

Ishihara, Y., Namiki, N., Sugita, S., **Matsumoto, K.**, **Goossens, S.**, **Araki, H.**, **Noda, H.**, **Sasaki, S.**, **Iwata, T.**, **Hanada, H.**: 2009, Localized gravity/topography correlation and admittance spectra on the Moon, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Ishihara, Y., **Noda, H.**, **Sasaki, S.**, Migita, E., **Araki, H.**, **Goossens, S.**, **Tazawa, S.**, **Kawano, N.**: 2008, Measurement of Lunar Impact Structures and Ridge Features from KAGUYA Altimetry (LALT) Data, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Ishikawa, R., **Tsuneta, S.**: 2008, Statistical properties of transient horizontal magnetic fields, Magnetic Coupling between the Interior and Atmosphere of the Sun, (Bangalore, India, Dec. 2-5, 2008).

Ishikawa, R.: 2008, New insights from Hinode-VTT He10830 observations, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Ishikawa, R.: 2008, Properties of transient horizontal magnetic field and its implication to a local dynamo process, SPD/AGU Meeting, (Fort Lauderdale, Florida, USA, May 27-30, 2008).

Ishikawa, R.: 2008, Statistical properties of transient horizontal magnetic fields, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Ita, Y.: 2008, AKARI IRC survey of the Large Magellanic Clouds, IAU Symp. 256, The Magellanic System: Stars, Gas, and Galaxies, (University of Keele, UK, Jul. 28-Aug. 1, 2008).

Ita, Y.: 2008, IRSF/SIRIUS variable star survey in the Magellanic Clouds, AGB stars and related phenomena, (Mitaka, Japan, Nov. 12-14, 2009).

Ito, T., Malhotra, R.: 2008, Asymmetric Impacts of the Near-Earth Asteroids on the Moon, Asteroids, Comets, Meteors - ACM 2008, (Baltimore, Maryland, USA, Jul. 13-18, 2008).

Ito, T., Malhotra, R.: 2008, Asymmetric Impacts of the Near-Earth Asteroids on the Moon, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ito, T., Malhotra, R.: 2009, Asymmetric cratering on the Moon and very slow NEAs, Subaru Users Meeting 2008, (Mitaka, Japan, Jan. 14-16, 2009).

Itoh, S., **Agata, H.**, **Nagai, T.**, **Nakayama, H.**, **Naito, S.**, **Hirai, A.**: 2008, What We Are Aiming at on "Science Culture Promotion Unit Through Astronomical Images", 2008 Int. Planetarium Society Conf., (The Adler Planetarium, Chicago, USA, July 1, 2008).

Itoh, S., **Agata, H.**, **Nagai, T.**, **Nakayama, H.**, **Naito, S.**, **Hirai, A.**: 2009, What is our "Science Culture Promotion Unit through Astronomy Images?", Int. Symp. for Immersive Science Visualization 2009, (Mitaka, Japan, Mar. 22-23, 2009).

Iwata, I.: 2008, Ionizing Radiation from Galaxies at z=3 through Wide-field Narrow-band Imaging, Far Away: Light in the Young Universe, 24th IAP Colloquim, (Paris, France, Jul. 7-11, 2008).

Iwata, T., Minamino, H., Namiki, N., **Hanada, H.**, **Noda, H.**, **Matsumoto, K.**, **Kawano, N.**, **Tsuruta, S.**, **Liu, Q.**, **Kikuchi, F.**, **Goossens, S.**, **Ishihara, Y.**, **Takano, T.**: 2008, On-orbit Properties and Initial Results of SELENE / KAGUYA Small Sub-satellites OKINA & OUNA for Lunar Gravity Mapping, IAC2008, (Glasgow, UK, Sep. 29-Oct. 3, 2008).

Iwata, T., Minamino, H., Sasaki, T., Satoh, A., Takano, T., Namiki, N., **Hanada, H.**, **Noda, H.**, **Kawano, N.**, **Matsumoto, K.**, **Tsuruta, S.**, **Kikuchi, F.**: 2008, Properties of SELENE Small Satellites; Rstar (Okina) and Vstar (Ouna), The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Iwata, T., Namiki, N., **Hanada, H.**, **Matsumoto, K.**, **Noda, H.**, Ogawa, M., **Kawano, N.**, **Asari, K.**, **Tsuruta, S.**, **Goossens, S.**, **Liu, Q.**, **Kikuchi, F.**, **Ishihara, Y.**, **Ishikawa, T.**, **Sasaki, S.**: 2008, The Global Mapping of Lunar Gravity Field by KAGUYA, OKINA, and OUNA, 29th URSI General Assembly, (Chicago, USA, Aug. 9-16, 2008).

Iwata, T., Namiki, N., **Matsumoto, K.**, **Hanada, H.**, **Noda, H.**, Ogawa, M., **Kawano, N.**, **Asari, K.**, **Tsuruta, S.**, **Goossens, S.**, **Liu, Q.**, **Kikuchi, F.**, **Ishihara, Y.**, **Ishikawa, T.**, **Sasaki, S.**: 2008, Initial Results of Global Lunar Gravity Field Mapping by KAGUYA, OKINA, and OUNA, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Iwata, T., **Noda, H.**, Misawa, H., Tsuchiya, F., Imai, K., Kondo, T., **Kawano, N.**, **Ujihara, H.**, **Inoue, M.**: 2008, A study on the Observation System for the Lunar Low Frequency Astronomical Observatory, 29th URSI General Assembly, (Chicago, USA, Aug. 9-16, 2008).

Iye, M.: 2008, High redshift galaxy surveys, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Izumiura, H., **Kambe, E.**, Sato, B., Salem, S. O., Yilmaz, M., Keskin, K., Yakut, K., Ozisik, V. Bikmaev, M.: 2008, Planet Search Program at RTT150, Workshop on Exoplanet search Program between China and Japan, (Mitaka, Japan, Apr. 23-25, 2008).

Izumiura, H., **Nakaya, H.**, **Otsuka, M.**, **Kambe, E.**, **Koyano, H.**, **Nagayama, S.**, **Yanagisawa, K.**, **Yoshida, M.**: 2008, Current Status of the HIDES Mosaicked CCD camera, 3rd Workshop of Astronomy with Precise Radial Velocity: Exoplanet Search and Astroseismology, (Jeju, Korea, Aug. 31-Sep. 5, 2008).

Izumiura, H., **Nakaya, H.**, **Otsuka, M.**, **Kambe, E.**, **Koyano, H.**, **Nagayama, S.**, **Yanagisawa, K.**, **Yoshida, M.**: 2008, Recent Progress on the HIDES Mosaic CCD Camera, Workshop on Exoplanet search Program between China and Japan, (Mitaka, Japan, Apr. 23-25, 2008).

Izumiura, H., Yamamura, I., Ueta, T., Nakada, Y., Matsunaga, N., **Ita, Y.**, **Matsuura, M.**, Fukushi, H., Mito, H., Tanabe, T.: 2009, Far -IR Imaging Survey of the Extended Dust Shells of Evolved Stars with AKARI, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Izumiura, H.: 2008, AKARI's View of the Extended Dust Shells of Evolved Stars, AGB stars and related phenomena, (Mitaka, Japan, Nov. 12-14, 2009).

Jeschke, E.: 2008, A Framework for the Subaru Telescope Observation Control System Processing Based on the Command Design Pattern, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Jeschke, E.: 2008, A Lightweight, Fault-Tolerant Middleware for a Subaru Telescope Second Generation Observation Control System, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Kadono, T., Sugita, S., Ootsubo, T., Kawakita, H., Sako, S., Miyata, T., Honda, M., **Furusho, R.**, **Watanabe, J.**: 2008, Interpretation on Deep Impact results, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Kajino, T.: 2009, Neutrino mass in cosmology and oscillation in supernova-nucleosynthesis, Int. Workshop on Frontiers in Theoretical Neutrino Physics, (University of Paris, Paris, France, Mar. 16-19, 2009).

Kambe, E.: 2008, A Fiber-Link between Oakayam 1.89-m Telescope and HIDES: Toward Higher Throughput and Radial Velociry Measurement Precision, 3rd Workshop of Astronomy with Precise Radial Velocity: Exoplanet Search and Astroseismology, (Jeju, Korea, Aug. 31-Sep. 5, 2008).

Kambe, E.: 2008, Comments on LAMOST-ET, Workshop on Exoplanet search Program between China and Japan, (Mitaka, Japan, Apr. 23-25, 2008).

Kambe, E.: 2008, Current Status of Software Development for Okayama, Workshop on Exoplanet search Program between China and Japan, (Mitaka, Japan, Apr. 23-25, 2008).

Kameya, O.: 2009, New Observation System of Mizusawa 10m Radio Telescope, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Kamikura, M., **Naruse, M.**, **Asayama, S.**, **Satou, N.**, Shan, W., **Sekimoto, Y.**: 2008, Development of a 385-500 GHz Orthomode Transducer (OMT), 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Kamio, S.: 2008, Dynamics of solar transition region, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Kamio, S.: 2008, The relation between explosive events and photospheric magnetic fields, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Kamohara, R.: 2008, VERA observations of SiO masers in the symbiotic star R Aquarii, AGB stars and related phenomena, (Mitaka, Japan, Nov. 12-14, 2009).

Kandori, R., et al.: 2008, Gravitational Distortion of Magnetic Field Lines in Prestellar Cores, IAU Symp. 259, Cosmic Magnetic Fields: from Planets, to Stars and Galaxies, (Canary Islands, Spain, Nov. 3-7, 2008).

Kandori, R., et al.: 2008, SEEDS Target Selection in Nearby Stars Category, SEEDS Science Workshop, (Mitaka, Japan, Sep. 3-4, 2008).

Kandori, R., et al.: 2008, Subaru Exoplanet Survey, Science with AO-fed instruments on Large Telescopes, (Dunk Island, Australia, Apr. 6-11, 2008).

Kandori, R., et al.: 2009, SEEDS NS Category Report, Science Workshop on Subaru Strategic Exploration of Exoplanets and Disks (SEEDS) 2, (Mitaka, Japan, Jan. 17, 2009).

Kandori, R., et al.: 2009, Selection of Nearby Star Targets for the Subaru Strategic Exploration of Exoplanets and Disks, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Kasuga, T., Jewitt, D.: 2008, Observations of 1999 YC and the Breakup of the Geminid Stream Parent, Future Ground based Solar System Research: Synergies with Space Probesand Space Telescope, (Isola d'Elba, Italy, Sep. 8-12, 2008).

Kasuga, T., Tsuboi, M., **Ogawa, H.**, **Ujihara, H.**: 2008, GFRP Waveguide Assembly for the Cooled Receiver on board the Radio Astronomical Satellite ASTRO-G (VSOP-2), 29th URSI General Assembly, , (Chicago, USA, Aug. 9-16, 2008).

Kato, H., **Furusho, R.**, **Watanabe, J.**: 2008, CCD Imaging of 17P/Holmes after its Outburst, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Katsukawa, Y.: 2008, Chromospheric Activity at the Smallest Scales Obtained by Hinode, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Katsukawa, Y.: 2008, Photospheric activities inside sunspots and their relationship with heating of the upper atmosphere, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Katsukawa, Y.: 2008, Photospheric Signature of Penumbral Microjets, SPD/AGU Meeting, (Fort Lauderdale, Florida, USA, May 27-30, 2008).

Katsukawa, Y.: 2008, Plan-B Mission description, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Kawaguchi, N.: 2009, Possible Enginineering Support for Dual Polarization and Ultra Wide Band Obs ervation with EAVN, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Kawakatsu, N., **Nagai, H.**, **Kino, M.**: 2008, Fate of baby radio galaxies: Dead or Survive?, The 4th Workshop on Compact Steep Spectrum and GHz-Peaked Spectrum Radio Sources, (Riccione, Italy, May 26-29, 2008).

Kawakatsu, N., **Wada, K.**: 2008, Co-evolution model of AGNs and nuclear starburst, The Starburst-AGN Connection Conf., (Shanghai, China, Oct. 27-31, 2008).

Kawamura, S.: 2008, 100MHz gravitational wave detection, Gravitational Wave Advanced Detector Workshop, (Elba, Italy, May 12-18, 2008).

Kawamura, S.: 2008, DECIGO, Gravitational Wave Advanced Detector Workshop, (Elba, Italy, May 12-18, 2008).

Kawamura, S.: 2008, DECIGO, 1st Int. LISA-DECIGO Workshop, (Kanagawa, Japan, Nov. 12-13, 2008).

Kawamura, S.: 2008, Juggling Interferometer, LSC-Virgo Joint Meeting, (Amsterdam, Netherlands, Sep. 22-25, 2008).

Kawamura, S.: 2009, Japanese Space Gravitational Wave Antenna DECIGO, 1st Int. Conf. on Space Optical Systems and Applications, (Tokyo, Japan, Feb. 4-6, 2009).

Kikuchi, F., et al. including **Liu, Q.**, **Matsumoto, K.**, **Ishihara, Y.**, **Hanada, H.**, **Kawano, N.**, **Sasaki, S.**: 2008, Differential Phase Delay Estimation in VRAD mission of SELENE (KAGUYA), The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Kikuchi, F., **Liu, Q.**, **Petrova, N.**, **Noda, H.**, **Matsumoto, K.**, **Ishihara, Y.**, **Goossens, S.**, **Asari, K.**, **Tsuruta, S.**, **Ishikawa, T.**, **Hanada, H.**, **Iwata, T.**, Namiki, N., **Kawano, N.**, **Sasaki, S.**: 2008, VLBI observations in VRAD mission of Kaguya (SELENE), 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Kim, M.: 2009, SiO maser observations towards Orion-KL with VERA, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Kimura, K., et al. including **Ogawa, H.**, **Ujihara, H.**: 2008, STRO-G/VSOP-2 Off-Set Cassegrain Telescope, The 2008

IEEE Int. Symp. on Antennas and Propagation and the 2008 USNC/URSI National Radio Science meeting, (San Diego, CA, USA, Jul. 5-12, 2008).

Kimura, K., **Ogawa, H.**, **Ujihara, H.**, Murata, Y., Tsuboi, M., Saito, H., Kasuga, T.: 2008, Development of the Optical System for VSOP-2 Offset Cassegrain Antenna, 29th URSI General Assembly, , (Chicago, USA, Aug. 9-16, 2008).

Kiuchi, H., Kawanishi, T., **Yamada, M.**, Sakamoto, T., Tsuchiya, M., Amagai, J., Izutsu, M.: 2008, Photonic Millimeter-wave generation and transmission system applicable to the ALMA Radio Telescopes, URSI: Int. Union of Radio Science, (Chicago, USA, Aug. 7-16, 2008).

Kobayashi, H., **Kawaguchi, N.**, **Shibata, K.-M.**, **Honma, M.**, **Manabe, S.**, **Tamura, Y.**, **Kameya, O.**, **Hirota, T.**, **Jike, T.**, Imai, H., Omodaka, T.: 2008, Recent Results and Progress of VERA, URSI: Int. Union of Radio Science, (Chicago, USA, Aug. 7-16, 2008).

Kobayashi, H.: 2008, Direct distance measurements of Milky way stars with VERA, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Kobayashi, H.: 2008, Recent activities of VERA and East Asis VLBI Network, 9th European VLBI Symp., (Bologna, Italy, Sep. 22-26, 2008).

Kobayashi, H.: 2008, VLBI activities in Japan and East Asia, The 23rd Int. Technical Conf. on Circuits/Systems, Computers and Communications, (Shimonoseki, Japan, July 6-9, 2008).

Kobayashi, H.: 2009, Status and future plan of East Asia VLBI network, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Kobayashi, H.: 2009, URSI Noth American General Assembly, Japanese VLBI activities VERA and VSOP-2, (University of Boldeaur, USA, Jan. 5-8, 2009).

Kobayashi, H.: 2009, VLBI in Eastern Asia and Pacific, 10th Anniversary meeting of Int. VLBI Service, (University of Bordeaux, France, Mar. 24, 2009).

Kobayashi, M.: 2009, LAE in Hierarchical Galaxy Formation, Understanding Lyman-alpha Emitters, (Heidelberg, Germany, Oct. 6-10, 2008).

Kodama, T.: 2008, Ultimate Studies of Environmental Effects in Cosmic Webs in the Distant Universe, Cosmology Near and Far: Science with WFMOS, (Kona Hawaii, USA, May 19-21, 2008).

Kodama, T.: 2008, When and Where Did Early-Type Galaxies Form?, Int. Lorenz Center Workshop, Galaxies in Real Life and Simulations, (Leiden, Netherland, Sep. 15-19, 2008).

Kojima, K., Ichiki, K., **Kajino, T.**, Mathews, G. J., **Yamazaki, D. G.**: 2008, Neutrino mass effect on CMB polarization in the existence of primordial magnetic field, Int. Symp. on Cosmology and Particle Astrophysicsk, (APCTP, Korea, Oct. 28-Nov. 1, 2008).

Kojima, K., Ichiki, K., **Kajino, T.**, Mathews, G. J., **Yamazaki, D. G.**: 2008, Neutrino mass effects on the CMB polarization with PMF, The 6th Japan-Italy symposium on Heavy-Ion Physics, (Tokai, Ibaraki, Japan, Nov. 11-15, 2008).

Kojima, K., Ichiki, K., **Kajino, T.**, Mathews, G. J.: 2008, A new method to constrain the neutrino mass from CMB polarization with PMF, The 7th RESCEU Int. Symp. on Astroparticle Physics and Cosmology, (Tokyo, Japan, Nov. 11-14, 2008).

Kojima, K., **Yamazaki, D. G.**, **Kajino, T.**: 2008, Neutrino effects in Cosmology with the primordial magnetic field, 10th Symp. on Nuclei in the Cosmos, (Mackinac Island, Michigan, USA, July 27-Aug. 1, 2008).

Kojima, T., **Kroug, M.**, **Fujii, Y.**, **Uzawa, Y.**, Takeda, M., Wang, Z., Shi, S.-C., Shan, W.-L.: 2008, Performance of terahertz waveguide SIS mixers employing epitaxial NbN films and Nb junctions, Applied Superconductivity Conf., (Chicago, USA, Aug. 17-22, 2008).

Kojima, T., **Kroug, M.**, Takeda, M., Shan, W.-L., **Fujii, Y.**, **Uzawa, Y.**, Wang, Z., Shi, S.-C.: 2008, Performance of terahertz waveguide SIS mixers employing epitaxial NbN films and Nb junctions, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Kojima, T., **Uzawa, Y.**, Shan, W.-L., **Fujii, Y.**, Takeda, M., **Kroug, M.**, **Shitov, S.**, **Ogawa, H.**: 2008, Characterization of waveguide components for the ALMA band 10, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Kokubo, E.: 2008, Dynamics of Planetary Accretion , The 3rd East-Asia Numerical Astrophysics Meeting, (Nanjing, China, Nov. 10-13, 2008).

Kokubo, E.: 2008, Formation of Terrestrial Planets, Origin and Evolution of Planets 2008, (Ascona, Switzerland, June 29-July 4, 2008).

Kokubo, E.: 2008, Formation of Terrestrial Planets from Protoplanets, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Kokubo, E.: 2008, Formation of Terrestrial Planets from Protoplanets, Exoplanets and Disks: Their Formation and Diversity, (Keauhou, Hawaii, USA, Mar. 9-12, 2009).

Kokubo, E.: 2008, Formation of Terrestrial Planets under a Realistic Accretion Condition, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Komiyama, Y.: 2008, HSC Camera Design, Cosmology Near and Far: Science with WFMOS, (Kona Hawaii, USA, May 19-21, 2008).

Komiyama, Y.: 2009, Hyper Suprime-Cam Camera Mechanics Design and Status, Japan-Princeton-Taiwan HSC Workshop, (Mitaka, Japan, Jan. 17-20, 2009).

Kotake, K.: 2008, Gravitational Radiation from SASI-aided Rotating Supernova Explosions in Three Dimensions, Numerical Modeling of Astrophysical Sources of Gravitational Waves, (Valencia, Spain, Sep. 8-12, 2008).

Kotake, K.: 2008, Gravitational waves from core-collapse supernovae: key to the explosion mechanism, 24th Texas Symp. on Relativistic Astrophysics, (Vancouver, Canada, Dec. 8-12, 2008).

Kotake, K.: 2008, Multidimensional modeling of core-collapse supernovae: new challenges and perspectives, The 7th RESCEU Int. Symp. on Astroparticle Physics and Cosmology, (Tokyo, Japan, Nov. 11-14, 2008).

Kotake, K.: 2008, Stochastic Nature of Gravitational-wave Signals from 3D Supernova Explosions, Asymmetric instabilities in stellar collapse, (Paris, France, June 30-Jul. 11).

Kotoku, J.: 2008, Long Time Observation of X-Ray Bright Point with Hinode, The 2nd Hinode Science Meeting - Beyond

Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Kroug, M., **Endo, A.**, **Tamura, T.**, **Noguchi, T.**, **Uzawa, Y.**, Takeda, M., Wang, Z., Shan, W.: 2008, SIS Mixer Fabrication for ALMA Band10, Applied Superconductivity Conf., (Chicago, USA, Aug. 17-22, 2008).

Kroug, M., **Kojima, T.**, **Fujii, Y.**, **Uzawa, Y.**, **Endo, A.**, **Tamura, T.**, Kiuchi, Y., **Noguchi, T.**, Takeda, M., Wang, Z., Shan, W.: 2008, SIS mixers for ALMA band-10(787-950 GHz), The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Kusakabe, M., **Kajino, T.**, Mathews, G. J.: 2008, Big Bang Production of ^{6,7}Li via the SUSY NLSP, 18th Midwest Relativity Meeting, (Notre Dame, Indiana, Oct. 24-25, 2008).

Kusakabe, N., et al.: 2008, Magnetic Fields in Massive Star Forming Regions: Wide-field NIR Polarimetry of M 42 and Mon R2, IAU Symp. 259, Cosmic Magnetic Fields: from Planets, to Stars and Galaxies, (Canary Islands, Spain, Nov. 3-7, 2008).

Liu, Q., et al. including **Kikuchi, F.**, **Goossens, S.**, **Matsumoto, K.**, **Harada, Y.**, **Ishihara, Y.**, **Hanada, H.**, **Asari, K.**, **Ishikawa, T.**, **Tsuruta, S.**, **Kawano, N.**, **Sasaki, S.**, **Noda, H.**: 2008, Correcting atmospheric and ionospheric delay in KAGUYA VLBI observations using GPS technique, Int. Symp. on GPS/GNSS 2008, (Tokyo, Japan, Nov. 11-14, 2008).

Liu, Q., et al. including **Kikuchi, F.**, **Matsumoto, K.**, **Goossens, S.**, **Hanada, H.**, **Harada, Y.**, **Asari, K.**, **Ishikawa, T.**, **Tsuruta, S.**, **Kawano, N.**, **Ishihara, Y.**, **Noda, H.**, **Sasaki, S.**: 2009, Same-beam VLBI observations of SELENE for detecting lunar gravity field, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Liu, Q., et al. including **Kikuchi, F.**, **Matsumoto, K.**, **Hanada, H.**, **Ishihara, Y.**, **Kawano, N.**, **Asari, K.**, **Noda, H.**, **Ishikawa, T.**, **Tsuruta, S.**, **Goossens, S.**, **Sasaki, S.**: 2008, Studies on Doppler and differential VLBI techniques using two sub-satellites OKINA and OUNA of KAGUYA (SELENE), AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Liu, Q., et al. including **Kikuchi, F.**, **Matsumoto, K.**, **Ishihara, Y.**, **Hanada, H.**, **Kawano, N.**, **Asari, K.**, **Ishikawa, T.**, **Tsuruta, S.**, **Goossens, S.**, **Noda, H.**, **Sasaki, S.**: 2008, Same-beam and switching VLBI observations for SELENE(KAGUYA) using eight VLBI stations, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Liu, Q., **Kikuchi, F.**, **Matsumoto, K.**, **Goossens, S.**, **Hanada, H.**, **Iwata, T.**, Namiki, N., **Noda, H.**, **Ishihara, Y.**, **Asari, K.**, **Ishikawa, T.**, **Tsuruta, S.**, **Harada, Y.**, **Kawano, N.**, **Sasaki, S.**: 2009, Studies on 4-way Doppler and differential VLBI techniques of Kaguya (SELENE) for detecting lunar gravity field, The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Machida, M., Matsumoto, R.: 2008, Magneto-hydrodynamic Simulations of Excitation of Low-Frequency QPOs in Black Hole Candidates, Astrophysics with All-Sky X-ray Observations, (Saitama, Japan, Oct. 12, 2008).

Machida, M.: 2008, Formation of an Inner Torus in Black Hole Accretion Flows, Turbulence and Oscillations in Accretion Discs, (Stockholm, Sweden, Oct. 1-15, 2008).

Magara, T.: 2008, Emergence of a Partially Split Flux Tube in the Solar Atmosphere, 2008 Huntsville Workshop, (Huntsville, AL, USA, Oct. 29, 2008).

Magara, T.: 2008, Hinode's Observational Result on the Saturation of Magnetic Helicity Injected into the Solar Atmosphere and its Relation to the Occurrence of a Solar Flare, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Magara, T.: 2008, New view of the Sun revealed by Hinode, The East Asian Young Astronomers Meeting 2008, (Jiayuguan, China, July 27-Aug. 1, 2008).

Magara, T.: 2008, Toward understanding 3D and dynamic nature of solar prominences, Solar Activity in Solar Cycle 24, (Napa, CA, USA, Dec. 8-12, 2008).

Magara, T.: 2008, What do we learn from the flux emergence study based on a comparison between simulations and observations? II, 2008 Flux Emergence Workshop, (Kyoto, Japan, Oct. 6-9, 2008).

Makino, J.: 2008, GRAPE-DR: An accelerator for scientific computing , HAC2008, (Tsukuba, Japan, Oct 1, 2008).

Makino, J.: 2008, Numerical Simulation of Galaxy Formation, From Genome to Snowball Earth, (Tokyo, Japan, Sep. 28-Oct. 3, 2008).

Mann, I., **Ishiguro, M.**: 2008, Optical Properties of Cometary Coma and Trail Particles, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Matsumoto, K., **Goossens, S.**, **Ishihara, Y.**, **Liu, Q.**, **Iwata, T.**, Namiki, N., **Noda, H.**, **Hanada, H.**, **Kikuchi, F.**, **Kawano, N.**, **Tsuruta, S.**, **Asari, K.**, **Ishikawa, T.**, **Sasaki, S.**: 2008, Initial results of global lunar gravity field recovery from SELENE tracking data, Earth Tides Symp. 2008, IAG, (Jena, Germany, Sep. 1-5, 2008).

Matsumoto, K., **Goossens, S.**, **Ishihara, Y.**, **Liu, Q.**, **Iwata, T.**, Namiki, N., **Noda, H.**, **Hanada, H.**, **Kikuchi, F.**, **Kawano, N.**, **Tsuruta, S.**, **Asari, K.**, **Ishikawa, T.**, **Sasaki, S.**: 2008, Initial Results of Global Lunar Gravity Field Recovery from SELENE tracking data, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Matsumoto, K., Namiki, N., **Goossens, S.**, **Ishihara, Y.**, **Liu, Q.**, **Kikuchi, F.**, **Iwata, T.**, **Hanada, H.**, **Noda, H.**, **Kawano, N.**, **Asari, K.**, **Tsuruta, S.**, **Ishikawa, T.**, **Harada, Y.**, **Sasaki, S.**, Kurosawa, K., Sugita, S., Imamura, T., RSAT/VRAD Mission Team: 2009, Current Status of Gravity Field Estimation from Tracking Data of SELENE (Kaguya), The 3rd KAGUYA (SELENE) Science Working Team Meeting, (Tamachi, Japan, Jan. 14-15, 2009).

Matsumoto, N.: 2008, Variable Asymmetry of the Circumstellar Envelope in IK Tauri Traced by SiO Maser Emission, AGB stars and related phenomena, (Mitaka, Japan, Nov. 12-14, 2009).

Matsuo, H., Aria, T., Nitta, T., Kosaka, A.: 2009, Far-infrared spectroscopic imaging of interstellar material around eta-Carinae, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Matsuo, H., **Hibi, Y.**, Nagata, H., Arai, H., Ariyoshi, S., Otani, C., Ikeda, H., Fujiwara, M.: 2008, Design of Superconducting Terahertz Digicam, 33rd Int. Conf. on Infrared, Millimeter, and Terahertz Waves, (Pasadena, USA, Sep. 15-19, 2008).

Matsuo, H., **Hibi, Y.**, Nagata, H., Ariyoshi, S., Otani, C., Ikeda, H., Fujiwara, M.: 2008, Design of Superconducting Terahertz Digicam, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Matsuo, H., **Hibi, Y.**, Nagata, H., Ikeda, H., Fujiwara, M.: 2008, Cryogenic Readout Electronics for Cryogenic Readout Electronics for Superconductive Terahertz Superconductive Terahertz Digicam Digicam, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Matsuo, H., **Hibi, Y.**, Nagata, H., Nakahashi, M., Murakoshi, Y., Arai, H., Ariyoshi, S., Otani, C., Ikeda, H., Fujiwara, M.: 2008, System design of submillimeter-wave imaging array SISCAM, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Matsuo, H.: 2008, High Sensitivity THz Imaging Technologies for Astronomy and other Applications, 2008 Workshop for Microwave and Millimeter-waves, (Seoul, Korea, Oct. 9, 2008).

Matsuo, H.: 2009, Interferometer and detector developments in Japan, European Workshop on Far-Infrared Interferometry Technology Development, (Edinburgh, UK, Feb. 10-11, 2009).

Migita, E., **Araki, H.**, **Noda, H.**, **Tazawa, S.**, **Ishihara, Y.**, **Iwata, T.**: 2009, Measurement of Lunar Craters Size from SELENE /LALT, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Miyazaki, A.: 2009, First phase of the East Asia VLBI network using the K4/VSOP terminal, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Miyoshi, M.: 2008, Horizon Telescope in Andes. A Black Hole Imager, Int. Workshop on New Astronomical Facilities in Peru, in honor to Mutsumi Ishitsuka, (Lima, Peru, June 28- July 8, 2008).

Miyoshi, M.: 2009, High Resolutions in Spectra and Space Unveil the Existence of Black Holes in the Universe, SPECTRA 2009, Conf. on Spectroscopy and its Applications, (Lima, Peru, Mar. 2-13, 2009).

Mizuno, N.: 2008, The properties of molecular clouds across the Magellanic System, IAU Symp. 256, The Magellanic System: Stars, Gas, and Galaxies, (University of Keele, UK, Jul. 28-Aug. 1, 2008).

Morimoto, N., **Hanaoka, Y.**: 2008, Ultraviolet Jets as the Energy Release Events in the Chromosphere, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Moroz, L., Helbert, J., Maturilli, A., **Sasaki, S.**, Bischoff, A.: 2008, Laboratory studies of Mercury analogue materials: optical spectroscopy and space weathering simulation experiments, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Murakami, N., Uemura, R., Baba, N., Shibuya, H., **Nishikawa, J.**, Abe, L., **Tamura, M.**, Hashimoto, N.: 2008, Laboratory experiments on the 8-octant phase-mask coronagraph, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Murakami, N., Yokochi, K., **Nishikawa, J.**, **Tamura, M.**, Baba, N., Uemura, R., Hashimoto, N., Abe, L., Tavrov, A. V., Kurokawa, T., Takeda, M.: 2009, Development of 4th-Order Nulling Coronagraphs for Partially Resolved Stars, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Nagai, H.: 2008, Constraining the kinematic and spectral ages of the recurrent CSO 3C84 , The 4th Workshop on Compact Steep Spectrum and GHz-Peaked Spectrum Radio Sources, (Riccione, Italy, May 26-29, 2008).

Nagai, T., **Agata, H.**, **Itoh, S.**, **Nakayama, H.**, **Naito, S.**, **Hirai, A.**: 2009, Challenge of "Science Culture Promotion Unit Through Astronomical Images", IAU Symp. 260: The Rôle of Astronomy in Society and Culture, (UNESCO, Paris, France, Jan. 19-23, 2009).

Nagashima, K.: 2008, Travel-time analyses of an emerging-flux region, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Nagashima, M., Okamoto, T.: 2008, The Metal Enrichment of the Milky Way and its Satellites in a Hierarchical Galaxy Formation Model, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Nagata, H., Kobayashi, J., **Matsuo, H.**, **Hibi, Y.**, Nakahashi, M., Ikeda, H., Fujiwara, M.: 2008, Development of a cryogenic GaAs AC-coupled CTIA readout for far-infrared and submillimeter detectors, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Nagata, H., **Matsuo, H.**, **Hibi, Y.**, Kobayashi, J., Nakahashi, M., Ikeda, H., Fujiwara, M.: 2008, GaAs cryogenic readout electronics for high impedance detector arrays for far-infrared and submillimeter wavelength region, 8th Int. Workshop on Low Temperature Electronics, (Jena/Gabelbach, Germany, Jun. 22-25, 2008).

Nakajima, Y., **Tamura, M.**, **Sato, Y.**, **ATLAS team**: 2008, AKARI IRC Atlas and Catalog of Star Forming Regions, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Nakamura, K.: 2008, Second-order gauge-invariant cosmological perturbation theory –3. Consistency of equations–, The 18th Workshop on General Relativity and Gravitation in Japan, (Hiroshima, Japan, Nov. 17-21, 2008).

Nakamura, K.: 2008, Second-order gauge-invariant cosmological perturbation theory and its applications, Int. workshop: 11th Capra meeting on radiation reaction problem in General relativity, (Orleans, France, June 23-29, 2008).

Namiki, N., et al. including **Matsumoto, K.**, **Goossens, S.**, **Ishihara, Y.**, **Noda, H.**, **Sasaki, S.**, **Hanada, H.**, **Araki, H.**: 2009, Comparative study of compensation mechanism of Lunar impact basins from new gravity field model of SELENE (Kaguya), 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Namiki, N., **Hanada, H.**, **Iwata, T.**, RSAT Team, VRAD Team, and LALT team: 2008, Lunar far Side Gravity From SELENE Mission And Dichotomy of the Moon, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Namiki, N., **Hanada, H.**, **Iwata, T.**, RSAT, VRAD, and LALT teams: 2008, Lunar far side gravity from the KAGUYA (SELENE) mission and dichotomy of the moon., 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).

Narita, N.: 2008, Subaru HDS Ground-based Transmission

Spectroscopy for HD189733b, Molecules in the Atmospheres of Extrasolar Planets, (Paris, France, Nov. 19, 2008).

Narita, N.: 2008, Subaru HDS Ground-based Transmission Spectroscopy for the Transiting Exoplanet HD189733b, RESCEU Summer School, (Aomori, Japan, Aug. 30, 2008).

Narita, N.: 2008, The Rossiter-McLaughlin Effect and a Possible Spin-Orbit Misalignment in HD17156b, IAU Symp. 253, Transiting Planets, (Boston, USA, May 20, 2008).

Narita, N.: 2009, Past and Future Studies of Transiting Extrasolar Planets, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Naruse, M., **Kamikura, M.**, **Sekimoto, Y.**, **Ito, T.**, **Sugimoto, M.**, **Iizuka, Y.**, **Satou, N.**, **Kumagai, K.**: 2008, Near-field beam and cross-polarization pattern measurements of ALMA band 8 cartridges, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Naruse, M., **Sekimoto, Y.**, **Kamikura, M.**, **Sugimoto, M.**, **Ito, T.**, **Satou, N.**, **Kumagai, K.**, **Iizuka, Y.**, **Fujimoto, Y.**: 2008, Near-Field Beam Pattern Measurement of ALMA Band 8 (385 –500GHz) First Cartridge, 3rd European Conf. on Antenna and Propagation, (Berlin, Germany, Mar. 23-27, 2009).

Nishikawa, J., Yokochi, K., Abe, L., **Murakami, N.**, Kotani, T., **Tamura, M.**, Kurokawa, T., Tavrov, A. V., Takeda, M.: 2008, Virtual wavefront compensation and speckle reduction in coronagraph by unbalanced nulling interferometer (UNI) and phase and amplitude correction (PAC), SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Nishikawa, J., Yokochi, **Murakami, N.**, Abe, L., Kotani, T., **Tamura, M.**, Kurokawa, T., Tavrov, A. V., Takeda, M.: 2009, Coronagraph methods on precise wavefront compensation (UNI-PAC) and deep achromatic nulling, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Nishiyama, S., **Tamura, M.**, Hatano, H., Kanai, S., Kurita, M., Sato, S., Nagata, T., **IRSF/SIRIUS team**: 2008, Near-Infrared Polarimetry toward the Galactic Center, Astronomical Polarimetry 2008, (La Malbaie, Quebec, Canada, Jul. 6-11, 2008).

Nishizawa, J.: 2008, Cross-correlation study of the Rees-Sciama effect with the weak lensing and implications for dark energy, 3rd Biennial Leopoldina Conf. on dark energy, (Munich, Germany, Oct. 7-11, 2008).

Niwa, Y., **Arai, K.**, **Ueda, A.**, Sakagami, M., **Gouda, N.**, **Kobayashi, Y.**, Yamada, Y., **Yano, T.**: 2008, Development of laser interferometric high-precision geometry monitor for JASMINE, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Noda, H., **Araki, H.**, **Tazawa, S.**, **Ishihara, Y.**, Migita, E., **Kawano, N.**, **Sasaki, S.**, Tsubokawa, T., Kamiya, I., Oberst, J.: 2008, The First Global Lunar Topography Mapping by KAGUYA (SELENE) Laser Altimeter (LALT), EGU, (Vienna, Austria, Apr. 13-18, 2008).

Noda, H., **Araki, H.**, **Tazawa, S.**, **Ishihara, Y.**, Migita, E., **Kawano, N.**, Tsubokawa, T., Kamiya, I., **Sasaki, S.**, Oberst, J.: 2008, The first global lunar topography mapping by KAGUYA (SELENE) laser altimeter (LALT), 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Noda, H., **Hanada, H.**, **Iwata, T.**, **Kawano, N.**, **Sasaki, S.**, **Araki, H.**, Imamura, T.: 2008, Optical and low frequency radio observatory on the Moon, ILC(LEAG-ICEUM-SRR), (Cape Canaberal, USA, Oct. 28-31, 2008).

Noguchi, T.: 2008, Effect of complex superconducting gap energies on SIS tunneling current, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Oh, C.: 2009, Study of the Galactic rotation curve with VERA, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Ohishi, M.: 2008, Astrobiology-related research activity in the National Astronomical Observatory of Japan, SPIE, (San Diego, CA, USA, Aug. 13, 2008).

Ohishi, M.: 2008, Astronomical Virtual Observatories through International Collaborations, Fifty Years after IGY, (Tsukuba, Japan, Nov. 12, 2008).

Ohishi, M.: 2008, Construction of Virtual Observatories in the World, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China Aug. 3-6, 2008).

Ohishi, M.: 2008, Impact to the Radio Astronomy by the Interference caused by the Solar Power Satellite Systems, 29th URSI General Assembly, (Chicago, USA, Aug. 9-16, 2008).

Ohishi, M.: 2008, JVO and NaReGi (Japanese Grid middleware initiative), EURO-VO, Grid Workshop, (Garching, Germany, Apr. 10, 2008).

Ohishi, M.: 2008, Protection of Space-based Observations and the International Telecommunication Union (ITU), 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Ohishi, M.: 2008, Special Item: ITU/Leap Second, IVOA interoperability meeting 2008 Autumn, (Baltimore, Maryland, USA, Oct. 28, 2008).

Ohishi, M.: 2008, The spectral line survey in TMC-1 – Progress of the data analysis, Workshop for Interstellar Matter 2008, (Sapporo, Japan, Sep. 4, 2008).

Ohishi, N., Yoshizawa, M., **Nishikawa, J.**, **Murakami, N.**, **Torii, Y.**, **Suzuki, S.**, **Kubo, K.**, **Iwashita, H.**, Kondo, Y.: 2008, Recent progress at the MIRA: development of fringe tracking system, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Ohsuga, K.: 2008, Global Radiation Magneto-hydrodynamic Simulations of Accretion Flows and Outflows around Black Holes, The 3rd East-Asia Numerical Astrophysics Meeting, (Nanjing, China, Nov. 10-13, 2008).

Okada, T., Shiraishi, H., Kato, M., Grande, M., Shirai, K., Yamamoto, Y., **Arai, T.**, Ogawa, K.: 2008, X-ray fluorescence spectrometry of the Moon by the XRS onboard SELENE-KAGUYA, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Okada, T., Shiraishi, H., Shirai, K., Yamamoto, Y., **Arai, T.**, Ogawa, K., Kato, M., Grande, M., Selene Xrs Team: 2009, X-Ray Fluorescence Spectrometer (XRS) on Kaguya: Current Status and Results, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Okada, T., Yamamoto, Y., Ogawa, K., **Arai, T.**, Shirai, K.: 2008, X-ray fluorescence spectrometry for Hayabusa and Hayabusa-2 missions, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Okamoto, T. J.: 2008, Prominence and coronal magnetic fielda, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Okamoto, T. J.: 2008, Emergence of a helical flux rope and prominence formation, SPD/AGU Meeting, (Fort Lauderdale, Florida, USA, May 27-30, 2008).

Okamoto, T. J.: 2008, Emergence of a Helical Flux Rope and Prominence Formation, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Okamoto, T. J.: 2008, Observation of helical flux emergence, 2008 Flux Emergence Workshop, (Kyoto, Japan, Oct. 6-9, 2008).

Okamoto, T. J.: 2008, Emergence of a helical flux rope and prominence formation, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ootsubo, T., Ueno, M., **Ishiguro, M.**, Usui, F., Pyo, J., Hong, S. S., Mukai, T.: 2009, Mid-infrared spectrum of the zodiacal light observed by AKARI, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Ootsubo, T., Ueno, M., **Ishiguro, M.**, Usui, F., Pyo, J., Kwon, S. M., Mukai, T., Hong, S. S.: 2008, Spectroscopic Observations of Zodiacal Emission by AKARI, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Ootsubo, T., **Watanabe, J.**, Honda, M., Kawakita, H., Furusho, R.: 2008, Mid-infrared Observations of Cometary Dust by Subaru Telescope, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Oshima, T., Yoshitake, H.: 2008, Optimization Method for TES Microcalorimeters with Absorbers, Applied Superconductivity Conf., (Chicago, USA, Aug. 17-22, 2008).

Oyama, K., Imamura, T., **Iwata, T.**, Kono, Y., **Matsumoto, K.**, **Liu, Q.**, **Noda, H.**, Futaana, Y., Nabatov, A., Mochizuki, N., Andou, H.: 2008, Initial results of the lunar ionosphere observation with SELENE Radio Science, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Ozaki, S.: 2008, Optical Medium Resolution Spectroscopic Observation of NGC 1068, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Petrova, N., Gusev, A., **Hanada, H.**, Heki, K., **Kawano, N.**: 2008, Interpretation of the Lunar physical libration for future observations from the Lunar surface, EPSC 2008: European Planetary Science Congress, (Münster, Germany, Sep. 21-26, 2008).

Pyo, J., Hong, S. S., Kwon, S. M., **Ishiguro, M.**, Ueno, M., Usui, F., Ootsubo, T., Mukai, T.: 2008, Vertical Structure of the Interplanetary Dust Cloud, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Pyo, J., Hong, S. S., Kwon, S. M., Ueno, M., **Ishiguro, M.**, Usui, F., Ootsubo, T., Ishihara, D., Mukai, T.: 2009, The Zodiacal Dust Cloud Revealed by the AKARI IRC All-Sky Survey, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Pyo, T.-S., et al.: 2009, Transition Disks – Key of Disk Evolution and Planet Formation, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Saigo, K.: 2008, Observational Characteristics of the Rotating First Core, The 5th ALMA Japan-Taiwan science workshop, (National Tsin Hua University, Taiwan, Dec. 4-6, 2008).

Saigo, K.: 2008, Observational Characteristics of the Rotating First Core, ASTE Science Workshop, (Mitaka, Japan, Dec. 11-12, 2008).

Saigo, K.: 2008, The Formation and Evolution of the First Core, ALMA-JT, (Ibaraki University, Japan, Apr. 4-6, 2008).

Saitoh, T. R.: 2008, A parallel *N*-body/SPH code ASURA and its applications, Astrosim: Frontiers in Computational Astrophysics, (Ascona, Switzerland, July 13-18, 2008).

Saitoh, T. R.: 2008, Initial results of "Project Milkyway", The 3rd East-Asia Numerical Astrophysics Meeting, (Nanjing, China, Nov. 10-13, 2008).

Saitoh, T. R.: 2009, Formation of Globular Clusters in Colliding Galaxies, Formation and Evolution of Globular Clusters, (Santa Barbara, USA, Jan. 12-16, 2009).

Sakata, S., et al. including **Nishizawa, A.**, **Yamazaki, T.**, **Fukushima, M.**, **Kawamura, S.**: 2008, Development for observation and reduction of radiation pressure noise, Gravitational Wave Advanced Detector Workshop, (Elba, Italy, May 12-18, 2008).

Sakata, S., Miyakawa, O., **Nishizawa, A.**, Numata, N., **Nishida, E.**, **Ishizaki, H.**, Furusawa, A., **Kawamura, S.**: 2008, Development for observation and reduction of radiation pressure noise, LSC-Virgo Joint Meeting, (Amsterdam, Netherlands, Sep. 22-25, 2008).

Sakata, S., Rager, S., **Nishida, E.**, **Kawamura, S.**: 2009, Measurement of quantum efficiency of photodiode by radiation pressure, March LSC-Virgo Meeting, (Arcadia, California, USA, Mar 16-19, 2009).

Sako, N., **Hatsutori ,Y.**, Inamori, T., Nakasuka, S.: 2008, Small Infrared Astrometry Satellite Nano-JASMINE Bus System, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Sakurai, T.: 2008, Solar wind problems and what will newly be expected from Plan-A observations, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Sakurai, T.: 2008, Interpretation of magnetic filling factor observed with Hinode/SOT, Int. Workshop of 2008 Solar Total Eclipse, (Jiuquan, Gansu, China, Jul. 28-Aug. 5, 2008).

Sarugaku, Y., **Ishiguro, M.**, Ueno, M., Usui, F., Reach, W. T.: 2008, Large dust emission from Comet 2P/Encke in 2003 return, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Sarugaku. Y., **Ishiguro, M.**, Ueno, M., Usui, F.: 2008, Scattering Phase Function of the Comet 2P/Encke Dust Trail, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Sasaki, S., **Araki, H.**, **Hanada, H.**, Namiki, N., **Iwata, T.**, **Asari, K.**, **Goossens, S.**, **Ishihara, Y.**, **Ishikawa, T.**, **Kawano, N.**, **Kikuchi, F.**, **Liu, Q.**, **Matsumoto, K.**, **Noda, H.**, **Tazawa, S.**, **Tsuruta, S.**, **Harada, Y.**, **Petrova, N.**, Kurosawa, K., Sugita, S.: 2008, Global Topography and Gravity of the Moon Revealed by KAGUYA Mission, The 40th Annual Meeting of DPS-AAS, (Ithaca, USA, Oct. 10-15, 2008).

Sasaki, S., **Araki, H.**, **Hanada, H.**, Namiki, N., **Iwata, T.**, **Asari, K.**, **Goossens, S.**, **Ishihara, Y.**, **Ishikawa, T.**, **Kawano, N.**, **Kikuchi, F.**, **Liu, Q.**, **Matsumoto, K.**, **Noda, H.**, **Tazawa, S.**, **Tsuruta, S.**, Kurosawa, K., Seiji, S., Takano, T.: 2008, Global topography and gravity field of the Moon by SELENE (KAGUYA), ILC(LEAG-ICEUM-SRR), (Cape Canaberal, USA, Oct. 28-31, 2008).

Sasaki, S., et al.: 2008, Development of plane parallel impact-ionization dust/debris detector, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Sasaki, S., et al.: 2008, Investigation of Jovian satellites and the origin of Jovian system by LAPLACE, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Sasaki, S., et al.: 2008, Satellites and the Origin of the Jovian System: A New Page by Laplace, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Sasaki, S., Hiroi, T., Helbert, J.: 2008, Simulating Space Weathering on Mercury, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Sasaki, S., Hiroi, T.: 2008, Difference of Space Weathering Degree on Asteroids of Various Sizes, 71nd Annual Meeting of the Meteoritical Society, (Matsue, Japan, Jul. 28-Apr. 1, 2008).

Sasaki, S., **Ishihara, Y.**, **Noda, H.**, **Araki, H.**, Migita, E., **Tazawa, S.**: 2008, KAGUYA laser altimeter (LALT) initial results on lunar impact structures, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Sasaki, S., Namiki, N., **Hanada, H.**, **Iwata, T.**, **Kawano, N.**, **Matsumoto, K.**, **Noda, H.**, RSAT/VRAD Group: 2008, New lunar gravity field from SELENE (KAGUYA) gravity experiment using two subsatellites, EGU, (Vienna, Austria, Apr. 13-18, 2008).

Sasaki, S., Ohashi, H., Hirai, T., **Iwai, T.**, Shibata, H., Nogami, K., Fujii, M.: 2008, Development of Plane-Parallel Impact-Ionization Dust Detectors with Large Aperture: A Candidate for Kibo Exposed Facility Payload, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Sasaki, S., Satoh, T.: 2009, Japan's Mars Exploration Plan: MELOS, MEPAG Meeting, (Arlington, Virginia, USA, Mar. 3-4, 2009).

Sasaki, S.: 2008, Change of the space weathering rate on Mercury: Effect of the surface mixing, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Sasaki, S.: 2008, Surface heterogeneity of small asteroids, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Sasaki, S.: 2009, Gravity and Topography of Lunar Basins: Kaguya Results, Brown-Vernadsky Microsymposium 49, (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Sato, M., **Watanabe, J.**: 2008, Origin of the recent Orionid Outburst, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Sawada, T.: 2009, On-The-Fly Observing System of the Nobeyama 45-m and ASTE 10-m Telescopes, Annual meeting of the Chilean Astronomical Society, (Santiago, Chile, Jan. 14-16, 2009.

Sekiguchi, Y.: 2008, Stellar core collapse with microphysics in full general relativity, Numerical Modeling of Astrophysical Sources of Gravitational Waves, (Valencia, Spain, Sep. 8-12, 2008).

Sekiguchi, Y.: 2008, Towards clarifying the central engine of long gamma-ray bursts, The 18th Workshop on General Relativity and Gravitation in Japan, (Hiroshima, Japan, Nov. 17-21, 2008).

Sekii, T.: 2008, High-resolution Helioseismic Observations, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Sekii, T.: 2008, Sensitivity of large-angle method to detect deep-sheeted magnetic flux, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Sekimoto, Y., **Iizuka, Y.**, **Satou, N.**, **Ito, T.**, **Kumagai, K.**, **Kamikura, M.**, **Naruse, M.**, Shan, W. L.: 2008, Development of ALMA Band 8 (385-500 GHz) Cartridge, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Sekimoto, Y., **Iizuka, Y.**, **Satou, N.**, **Ito, T.**, **Kumgai, K.**, **Niizeki, Y.**, Fujimoto, Y., **Kamikura, M.**, **Naruse, M.**, Shan, W. L.: 2008, Evaluation of ALMA Band 8 (385–500 GHz) preproduction Cartridge #1, East Asia Submillimeter Receiver Workshop, (Taipei, Taiwan, Nov. 18-20, 2008).

Sekimoto, Y., **Matsuo, H.**, **Noguchi, T.**, **Uzawa, Y.**, **Hibi, Y.**, **Suzuki, T.**, **Endo, A.**, **Naruse, M.**: 2008, Development Plan of ATC SIS submm camera, East Asia Submillimeter Receiver Workshop, (Taipei, Taiwan, Nov. 18-20, 2008).

Shan, W.-L., Takeda, M., **Kojima, T.**, **Uzawa, Y.**, Shi, S. -C., Wang, Z.: 2008, Design and Performance of Waveguide Mixers with All NbN tunnel junctions on MgO substrates, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Shibasaki, K.: 2008, A Driving Mechanism of Temperature Dependent Plasma Up-Flows in the Solar Corona, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Shibasaki, K.: 2008, Leakage of Sub-photospheric Hot Plasma throught Magnetic Flux Tube, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Shimajiri, Y., Hiramatsu, M., **Tsukakoshi, T.**, Ikeda, N., **Momose, M.**, AzTEC team: 2008, AzTEC on ASTE: 1.1 mm Survey toward Lup-I, II, and III, (Helshinki Univ., Finland, Aug. 2008).

Shimajiri, Y., Takahashi, T., Takakuwa, S., **Saito, M.**, **Kawabe, R.**: 2008, Observational Evidence for Outflow-Triggered Star Formation in the OMC-2 FIR3/5 region, The Birth and Feedback of Massive Stars, Within and Beyond the Galaxy, (Charlottesville, USA, Sep. 25-27, 2008).

Shimajiri, Y., Takahashi, T., Takakuwa, S., **Saito, M.**, **Kawabe, R.**: 2008, Observational Evidence for Outflow-Triggered Star Formation in the OMC-2 FIR3/5 region, The 4th Japan-Taiwan ALMA Science Meeting, (Ibaragi, Japan, Apr. 5-6, 2008).

Shimajiri, Y., Takahashi, T., Takakuwa, S., **Saito, M.**, **Kawabe, R.**: 2008, On the triggered star formation in Orion Molecular Cloud, (Helshinki Univ., Finland, Aug. 2008).

Shimajiri, Y., Takahashi, T., Takakuwa, S., **Saito, M.**, **Kawabe, R.**: 2009, Observational Evidence for Outflow-Triggered Star Formation in the OMC-2 FIR3/4 region, 2nd Tokyo-NRO Workshop Chemical Diagnostics of Star and Planet Formation, (Univ. of Tokyo, Tokyo, Japan, Mar. 5-6, 2009).

Shimajiri, Y., **Yoshida, A.**, 45m Legacy project team: 2008, Intermediate Mass Star Formation, ALMA Science WG ISM Subgroup Meeting, (Univ. of Tokyo, Tokyo, Japan, Apr. 5-6, 2009).

Shimojo, M.: 2008, The relation between the magnetic fields and the coronal activities in the solar polar region, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Shimojo, M.: 2008, The Relationship Between the Magnetic Field and the Coronal Activities in the Polar Region, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Shimojo, M.: 2008, The Relationship Between the Magnetic Field and the Coronal Activities in the Polar Region, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Shirasaki, Y., et al. including **Tanaka, M.**, **Ohishi, M.**, **Mizumoto, Y.**: 2008, Application of Information Technologies on Astronomy: Japanese Virtual Observatory (JVO) Portal, Fifty Years after IGY, (Tsukuba, Japan, Nov. 12, 2008).

Shirasaki, Y., et al. including **Tanaka, M.**, **Ohishi, M.**, **Mizumoto, Y.**: 2008, The Japanese Virtual Observatory in action, Astronomical Data Analysis Software and Systems, (Quebec City, Canada, Nov. 2-5, 2008).

Shitov, S. V., **Inatani, J.**, Shan, W.-L., Takeda, M., Uvarov, A. V., Uzawa, Y., Vystavkin, A. N.: 2008, Measurement of emissivity of the ALMA antenna panel at 840 GHz using NbN-based heterodyne SIS receiver, 19th Int. Symp. on Space Terahertz Technology, (Groningen, Netherlands, Apr. 28-30, 2008).

Sôma, M., Tanikawa, K.: 2008, Japanese astronomy in the 7th century, The 6th Int. Conf. on Oriental Astronomy, (Townsvile, Australia, July 7-11, 2008).

Suematsu, Y.: 2008, Dynamical Nature of Solar Chromospheric Fine Structures Revealed with HINODE/SOT, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Suematsu, Y.: 2008, Dynamical Nature of Solar Spicules Revealed with HINODE/SOT, Int. Workshop of 2008 Solar Total Eclipse, (Jiuquan, Gansu, China, Jul. 28-Aug. 5, 2008).

Suematsu, Y.: 2008, Instrument Design and On-Orbit Performance of the solar Optical Telescope Aboard Hinode (Solar-B), Int. Conf. on Space Optics 2008, (Médiathèque José-Cabanis, Toulouse, France, Oct. 14-17, 2008).

Suematsu, Y.: 2008, Nature of Small-Scale Jets On the Solar Chromosphere Revealed with Hinode, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Suematsu, Y.: 2008, Review of Hinode Results, Int. Workshop of 2008 Solar Total Eclipse, (Jiuquan, Gansu, China, Jul. 28-Aug. 5, 2008).

Suematsu, Y.: 2009, Evolution and kinematics of mottles – spicules. Pro and after Hinode, ISSI Int. Research 1st Meeting; Solar small-scale transient phenomena and their role in coronal heating, (ISSI, Bern, Switzerland, Jan. 19-22, 2008).

Sugitani, K., **Tamura, M.**, **Watanabe, M.**, **IRSF/SIRPOL Team**: 2008, Near-Infrared Polarimetry of the Serpens core, Astronomical Polarimetry 2008, (La Malbaie, Quebec, Canada, Jul. 6-11, 2008).

Sugiyama, K., Sato, M., Nakajima, K., Takeuchi, S., Takahashi, Y.: 2008, Observation of Lightning on Jupiter by a Future Mission, AGU 2008 Fall Meeting, (San Francisco, CA, USA, Dec. 15-19, 2008).

Sunada, K.: 2009, New maser candidate sources in the AKARI-FIS Bright Source Catalogue, 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Suzuki, R.: 2008, HiCIAO status, SEEDS Science Workshop, (Mitaka, Japan, Sep. 3-4, 2008).

Suzuki, R.: 2009, HiCIAO: High Contrast Instrument for the Subaru Next Generation, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Suzuki, T., Kaneda, H., Onaka, T., Shibai, H.: 2009, Power-law relations between cold and warm dust emission intensities within nearby galaxies obtained with AKARI Far-Infrared Surveyor (FIS), AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Tachihara, K.: 2008, ALMA status, ASTE Science Workshop, (Mitaka, Japan, Dec. 11-12, 2008).

Tachihara, K.: 2008, Early phase of molecular outflow traced by high-J CO emission, The 5th ALMA Japan-Taiwan science workshop, (National Tsing Hua University, Taiwan, Dec. 5-6, 2008).

Tachihara, K.: 2008, Near-IR and high-J CO emission from low-mass class 0 objects, Star-formation subworking group meeting for ALMA of Japan and Taiwan, (Ibaragi, Japan, Apr. 4, 2008).

Tachihara, K.: 2009, East-Asian preparatory activities for ALMA on star formation, ALMA and ELTs: A Deeper, Finer View of the Universe, (ESO, Garching, Germany, Mar. 24-27, 2009).

Takahashi, K.: 2008, Formation of Intense Flux Tubes by Convective Collapse in the Emerging Flux Region, 2008 Flux Emergence Workshop, (Kyoto, Japan, Oct. 6-9, 2008).

Takahashi, K.: 2008, Similarity between the Molecular Loops in the Galactic Center and the Solar Chromospheric Arch Filaments, 2008 Flux Emergence Workshop, (Kyoto, Japan, Oct. 6-9, 2008).

Takahashi, R., Saito, Y.: 2008, Vacuum-system design for the large-scale cryogenic gravitational wave telescope (LCGT), 4th Vacuum and Surface Sciences Conf. of Asia and Australia, (Matsue, Japan, Oct. 28-31, 2008).

Takano, S.: 2008, Nobeyama 45m Legacy Project: Line Survey, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Takeda, M., **Kojima, T.**, Shan, W.-L., Nakayama, S., Saito, A., **Kroug, M.**, **Uzawa, Y.**, Wang, Z.: 2008, Current status of NbN-based SIS mixers for ALMA Band 10 development, The 9th Workshop on SMW Rx Technologies in Eastern Asia, (Taipei, Taiwan, Nov. 18-20, 2008).

Takeda, M., Shan, W. L., **Kojima, T.**, **Uzawa, Y.**, Saito, S., **Fujii, Y.**, Li, J., Shi, S. C., Wang, Z.: 2008, Mixing properties of NbN-based SIS mixers with NbTiN wirings, Applied Superconductivity Conf., (Chicago, USA, Aug. 17-22, 2008).

Takeda, T.: 2009, About the 4D2U Theater of the National Astronomical Observatory of Japan, Int. Symp. for Immersive Science Visualization 2009, (Mitaka, Japan, Mar. 22-23, 2009).

Takeda, Y.: 2008, Precision radial-velocity measurement in the context of line-profile variation, 3rd Workshop of Astronomy with Precise Radial Velocity: Exoplanet Search and Astroseismology, (Jeju, Korea, Aug. 31-Sep. 5, 2008).

Tamura, M., **Hashimoto, J.**, **Kandori, R.**, **Kusakabe, N.**, **Nakajima, Y.**, **Saito, H.**, **Sato, Y.**, Sato, S., Nagata, T., Hough, J.: 2008, Wide-Field Near-Infrared Polarimetry of Star Forming Regions: Magnetic Field Structures of the Rho Oph Core, Astronomical Polarimetry 2008, (La Malbaie, Quebec, Canada, Jul. 6-11, 2008).

Tamura, M., **Kandori, R.**, **Kusakabe, N.**, **Nakajima, Y.**, **Hashimoto, J.**, **Sato, Y.**, **Saito, H.**, Nishimayama, S., Fukue, T.: 2008, Wide Field Infrared Polarimetry: Dust and Magnetic Field in Star Forming Regions, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Tamura, M.: 2008, Exoplanet science in Japan, Exoplanet Forum, (Pasadena, USA, May 29-30, 2008).

Tamura, M.: 2008, SEEDS project, SEEDS Science Workshop, (Mitaka, Japan, Sep. 3-4, 2008).

Tamura, M.: 2008, YSO category, SEEDS Science Workshop, (Mitaka, Japan, Sep. 3-4, 2008).

Tamura, M.: 2008, Subaru strategic exploration of exoplanets and disks with HiCIAO/AO188, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Tamura, M.: 2009, Concluding Remark, Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Tamura, M.: 2009, Subaru Explorations of Disks and Exoplanets so far and "SEEDS", Exoplanets and Disks: Their Formation and Diversity, (Kona, Hawaii, USA, Mar. 9-11, 2009).

Tamura, Y., GGP Japan Group: 2008, Status of GGP Japan Data Center, Earth Tides Symp. 2008, IAG, (Jena, Germany, Sep. 1-5, 2008).

Tamura, Y., Omang, O .C. D.: 2008, Long Period Tide Observed at Ny-Alesund, Svalbard, Earth Tides Symp. 2008, IAG, (Jena, Germany, Sep. 1-5, 2008).

Tanaka, M., **Shirasaki, Y.**, **Ohishi, M.**, **Mizumoto, Y.**, **Kawanomoto, S.**, Yasuda, N., Honda, S.: 2008, Astronomical Researches using Virtual Observatories, Fifty Years after IGY, (Tsukuba, Japan, Nov. 12, 2008).

Tanikawa, K., Yamamoto, T., **Sôma, M.**: 2008, Solar eclipses at sunrise and sunset in the Chunqiu Era, The 6th Int. Conf. on Oriental Astronomy, (Townsvile, Australia, July 7-11, 2008).

Terazono, J., Tanaka, S., Sakamoto, S., **Watanabe, J.**, Wakabayashi, N.: 2009, Ten Years in Lunar and Planetary Exploration Outreach: "The Moon Station" Challenge, 40th Lunar and Planetary Science Conf., (The Woodlands, Texas, USA, Mar. 23-27, 2009).

Toda, M., Yamamoto, M., Abe, S., Shigeno, Y., Maeda, K., Suzuki, S., **Kasuga, T.**, Higa, Y., **Watanabe, J.**: 2008, Height Analyses of Short-duration Meteor Trains, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Tomisaka, K.: 2008, Effect of Magnetic Field in Star Formation, TIARA Workshop on Radiative Transfer, Chemistry, and Numerical Simulation, (National Taiwan University, Taipei, Taiwan, July 7-11).

Tomisaka, K.: 2008, Effect of Magnetic Field in Star Formation Process, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Tomisaka, K.: 2008, Observational Visualization: How is a First Core Observed?, The 3rd East-Asia Numerical Astrophysics Meeting, (Nanjing, China, Nov. 10-13, 2008).

Tonooka, H.: 2008, Hinode DVD for Public Outreach, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Tsuboi, M., Saito, H., Murata, Y., **Kasuga, T.**, Kimura, K., **Ogawa, H.**, **Ujihara, H.**, **Bushimata, T.**, **Umemoto, T.**: 2008, Space MM-WAVE Telescope of ASTRO-G Satellite, 29th URSI General Assembly, , (Chicago, USA, Aug. 9-16, 2008).

Tsujimoto, T.: 2008, Chemical Evolution of Omega Centauri from He to Ba, Chemical Evolution of Dwarf Galaxies and Stellar Clusters, (Garching, Germany, Jul. 21-25, 2008).

Tsujimoto, T.: 2008, New insights into the first stars in the Galactic halo and dwarf spheroidal galaxies, IAU Symp. 255, (Rapallo, Italy, June 16-20, 2008).

Tsuneta, S.: 2008, Contribution of Yohkoh observations to our current understanding of solar flares, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Tsuneta, S.: 2008, Dynamics of the Solar Atmosphere Revealed, Solar Variability, Earth's Climate, and Space Environment, (Bozmen, Montana, USA, June 1-6, 2008).

Tsuneta, S.: 2008, Hinode observations of polar fields, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Tsuneta, S.: 2008, Hinode results on the solar magnetic fields, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Tsuneta, S.: 2008, Polar Magnetic Flux and the High Speed Solar Wind, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Tsuneta, S.: 2008, Polar region, quiet Sun and Aflven waves as observed with Hinode, Magnetic Coupling between the Interior and Atmosphere of the Sun, (Bangalore, India, Dec. 2-5, 2008).

Tsuneta, S.: 2008, Recent results from Hinode, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Tsuneta, S.: 2008, Solar-C mission outline, Solar-C Science Definition Meeting, (Sagamihara, Japan, Nov. 17-21, 2008).

Tsuneta, S.: 2008, The SOLAR-C Mission, SPD/AGU Meeting, (Fort Lauderdale, Florida, USA, May 27-30, 2008).

Umemoto, T.: 2008, VSOP-2 observations of non-thermal radio continuum from Young Stellar Objects (YSOs), Space VLBI Science and the VSOP-2 Mission, (MPIfR, Bonn, Germany, May 14-16, 2008).

Umemoto, T.: 2009, Concept of VSOP-2 Science Operation Center (SOC, tentative), 2009 East Asia VLBI Workshop, (Ewha Woman's University, Seoul, Korea, Mar. 18-20, 2009).

Uraguchi, F., **Takato, N.**, **Iwata, I.**, **Koyano, H.**, **Mikami, Y.**: 2008, First results from turbulence profiling with SODAR at Subaru Telescope, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).

Usui, F., **Ishiguro, M.**, Ishihara, D., Ootsubo, T., Sarugaku, Y., Ueno, M.: 2008, 2006 Fragmentation of 73P/Schwassmann-Wachmann 3, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Usui, F., **Ishiguro, M.**, Ishihara, D., Ootsubo, T., Ueno, M.: 2009, AKARI observations of Broken Comet 73P/Schwassmann-Wachmann 3, AKARI Int. Conf., (Univ. of Tokyo, Tokyo, Japan, Feb. 16-19, 2009).

Uzawa, Y., **Kojima, T.**, **Kroug, M.**, **Fujii, Y.**, **Candotti, M.**, Shan, W. L., Takeda, M,. **Kaneko, K.**, **Shitov, S.**, Wang, M. J.: 2008, Development of the 787-950 GHz ALMA Band 10 Cartidge, 33rd Int. Conf. on Infrared, Millimeter, and Terahertz Waves, (California, USA, Sep. 17-19, 2008).

Wada, K.: 2008, Models of ISM on sub-kpc scales: Galactic central regions and disks, Astrosim: Frontiers in Computational Astrophysics, (Ascona, Switzerland, July 13-18, 2008).

Watanabe, J., Honda, M., **Ishiguro, M.**, Ootsubo, T., Kadono, T., Sakon, I., **Furusho, R.**: 2008, What happened in comet 17P/Holmes?, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Watanabe, J., et al. including **Ishiguro, M.**, **Fujiyoshi, T.**, **Fuse, T.**, **Takato, N.**, **Furusho, R.**: 2008, Subaru/COMICS Mid-infrared Observation of Near-nucleus Region of Comet 17P/Holmes at the Early Phase of the Outburst, Asteroids, Comets, Meteors - ACM 2008, (Baltimore, Maryland, USA, Jul. 13-18, 2008).

Watanabe, J., **Sato, M.**: 2008, Trial for relating meteor shower activities to parent comet activities, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Watanabe, T.: 2008, FeXIII density diagnostics for solar coronal and flare plasmas, 37th COSPAR Scientific Assembly, (Montreal, Canada, Jul. 13-20, 2008).

Watanabe, T.: 2008, The Solar-C Mission, NASA Heliophysics Town Hall Meeting Planning Our Strategy for the Future, (College Park, Maryland, USA, May 19-20, 2008).

Watanabe, T.: 2008, Production of high-temperature plasmas at the initial phase of a C9.7 flare, The 2nd Hinode Science Meeting - Beyond Discovery Toward Understanding, (Boulder, Colorado, USA, Sep. 29-Oct. 3, 2008).

Yamada, Y., Shimokawa, T., Shinomoto, S., **Yano, T.**, **Gouda, N.**: 2008, JASMINE –Japan Astrometry Satellite Mission for Infrared Exploration– data analysis and accuracy assessment with Kalman filter, Astronomical Data Analysis Software and Systems, (Quebec City, Canada, Nov. 2-5, 2008).

Yamada, Y., Yamauchi, M., **Gouda, N.**, **Kobayashi, Y.**, **Tsujimoto, T.**, **Yano, T.**, Suganuma, M., Nakasuka, S., Sako, N., Inamori, T.: 2008, A Star Image Extractor for Small Satellites, The 26th Int. Symp. on Space Technology and Science, (Hamamatsu, Japan, June 1-8, 2008).

Yamamoto, M., Toda, M., Higa, Y., Maeda, K., Abe, S., Suzuki, S., **Watanabe, J.**: 2008, Recent Progress of Meteor Train Studies: Visualization of Upper Atmosphere by Injected Materials, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Yamamoto, S., Kimura, H., Zubko, E., Kobayashi, H., Wada, K., **Ishiguro, M.**, Matsui, T.: 2008, Comet 9P/Tempel 1: Application of the Comet Standard Model to Observations of Its Dust, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Yamazaki, D. G.: 2008, A Strong Constraint on the Neutrino Mass from the Formation of Large Scale Structure in the Presence of the Primordial Magnetic Field, 10th Symp. on Nuclei in the Cosmos, (Mackinac Island, Michigan, USA, July 27-Aug. 1, 2008).

Yamazaki, D. G.: 2008, Limiting the Neutrino Mass and the Primordial Magnetic Field from the Large Scale Structure, The 7th RESCEU Int. Symp. on Astroparticle Physics and Cosmology, (Tokyo, Japan, Nov. 11-14, 2008).

Yasutake, N.: 2008, General Relativistic Compact Stars with Exotic Matter: Effects of rotation and strong magnetic field, The 6th Japan-Italy symposium on Heavy-Ion Physics, (Tokai, Ibaraki, Japan, Nov. 11-15, 2008).

Yokochi, K., Tavrov, A. V., **Nishikawa, J.**, Abe, L., **Tamura, M.**, Takeda, M, Kurokawa, T.: 2008, Achromatic characteristics in 3-D Sagnac interferometer based on geometric phase shift, Conf. on Lasers and Electro-Optics (CLEO), (San Jose, CA, USA, May 4-9, 2008).

Yoshida, F.: 2008, An Insight into the Solar System History through the Size Distribution of Jupiter Trojans, NCU seminar, (National Central University, Taiwan, May 27, 2008).

Yoshida, F.: 2008, An insight into the solar system history through the size distribution of Jupiter's Trojans, Asteroids, Comets, Meteors - ACM 2008, (Baltimore, Maryland, USA, Jul. 13-18, 2008).

Yoshida, F.: 2008, HSC survey for Small Solar system Bodies, Taiwan-Japan Subaru-HSC Science/Survey Mini Workshop, (ASIAA, Taipei, Taiwan, Dec. 8, 2008).

Yoshida, F.: 2008, Size distributions and total populations of L4 and L5 Jovian Trojans, AOGS 5th Annual Meeting, (Busan, Korea, June 16-20, 2008).

Yoshida, F.: 2009, Asteroid observations at the Maidanak observatory, Infrared Working Group Winter Workshop and 30th Meeting, (Yongpyong, Korea, Feb. 23-24, 2009).

Yoshida, F.: 2009, Photometric Observations of Young Asteroid Families at Maidanak Observatory, UBAI seminar, (Ulugh Beg Astronomical Institute, Uzbekistan, Feb. 19, 2009).

Yoshida, F.: 2009, Solar system, Japan-Princeton-Taiwan HSC Workshop, (Mitaka, Japan, Jan. 17-20, 2009).

Yoshida, F.: 2009, Toward the construction of an Extended Asian network for the Solar system body observation, East-Asian Core Observatory Association EACOA 2009 Meeting, (ASIAA, Taipei, Taiwan, Mar. 16-18, 2009).

Yoshida, H.: 2008, Necessary conditions for super-integrability of Hamiltonian systems with homogeneous potential, Dynamics Days Asia Pacific 5, (Nara, Japan, Sep. 9-12, 2008).

Yoshida, M.: 2008, Strange filamentary structures ("fireballs") around a merger galaxy in the Coma cluster of galaxies, The 10th Asian-Pacific Regional IAU Meeting, (Kunming, Yunnan, Nanjing, China, Aug. 3-6, 2008).

Yoshida, M.: 2009, Extended ionized gas regions around the Coma cluster galaxies, Subaru Users Meeting 2008, (Mitaka, Japan, Jan. 14-16, 2009).

Yoshida, T.: 2008, Effects of Spin-Flavor Conversion in Supernova Neutrino Signal, The 6th Japan-Italy symposium on Heavy-Ion Physics, (Tokai, Ibaraki, Japan, Nov. 11-15, 2008).

Yoshida, T.: 2008, Electron Fraction Dependence of Neutrino Spin-Flavor Conversion in Supernovae, The 7th RESCEU Int. Symp. on Astroparticle Physics and Cosmology, (Tokyo, Japan, Nov. 11-14, 2008).

Yoshida, T.: 2008, Neutrino Nucleosynthesis in Supernovae, The 6th Japan-Italy symposium on Heavy-Ion Physics, (Tokai, Ibaraki, Japan, Nov. 11-15, 2008).

Yoshida, T.: 2008, *n*-Process in Population III Core-Collapse Supernovae, 10th Symp. on Nuclei in the Cosmos, (Mackinac Island, Michigan, USA, July 27-Aug. 1, 2008).

Yoshida, T.: 2008, Supernova Mixing to Reproduce Isotopic Ratios of Presolar Grains, 10th Symp. on Nuclei in the Cosmos,, (Mackinac Island, Michigan, USA, July 27-Aug. 1, 2008).

Zubko, N., Baba, N., **Murakami, N.**: 2008, Polarization analysis as a means of detecting exoplanets and measuring their objective spectra, SPIE 2008 Astronomical Instrumentation, (Marseilles, France, June 23-28, 2008).