Small-JASMINE: Stray Light and Thermal Environment

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Small-JASMINE [1] is the astrometric satellite measuring the parallax and the proper motion with the accuracy of 10 μas level. Current status of the stray light and the thermal condition for small-JASMINE are reported.

1 Stray Light of Small-JASMINE

A lot of integration time is needed to accomplish the aim of accuracy of about 10 μas level in the Small-JASMINE mission. Accordingly, we need to observe the object until the albedo from the earth is close to the direction of 23 degrees from the observing direction. Therefore avoiding the stray light is very important task. We have investigated the baffle hood shown in Fig. 1. Inner baffle of the telescope shown in Fig. 2 is also considered.

Inner coating of the telescope using the carbon fiber developed by Energy Science Laboratories adopted by JWST is the first candidate for Small-JASMINE.

The requirement of the stray light is under 13 photons/pix/sec. It is achieved using the baffle hood and the inner baffle with the carbon fiber coating.

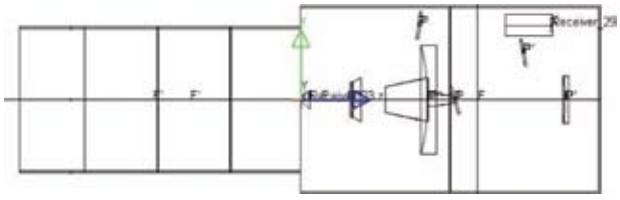

Figure 1: Baffle hood. We consider a few more baffle hoods.

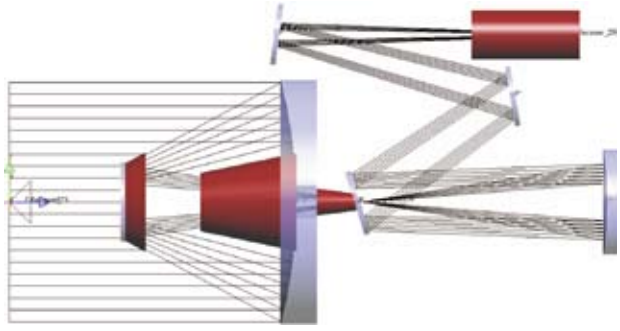

Figure 2: Inner baffle.

2 Attitude and the Thermal Condition for Small-JASMINE

The candidate of the detector of Small-JASMINE is HgCdTe detector, HAWAII-4RG-10, with 1.7 μm cut off developed by Teledyne. We need to operate the detector under 180 K. Accordingly the temperature of the telescope must be 180 K~200 K. The peltier cooling of the detector will be adopted. Then we calculate the thermal environment of the telescope under the attitude of the satellite shown in Fig. 3. We obtain that the telescope satisfies the temperature of under 190 K (See Fig. 4).

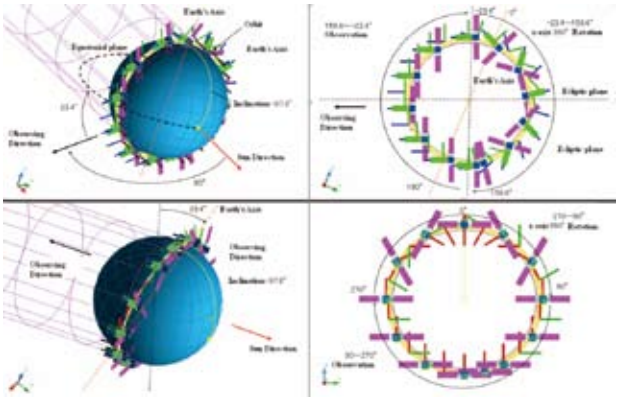

Figure 3: (Upper) attitude of the satellite in spring. (Lower) Same as upper panel but in summer.

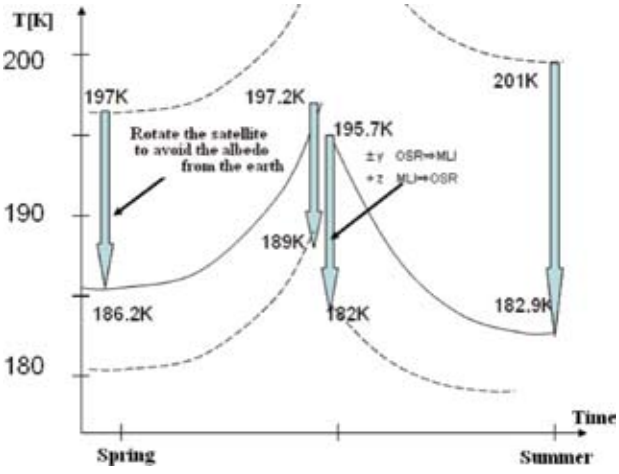

Figure 4: Tempreture of the telescope (primary mirror) against the time (season).

Reference

[1] Yano, T., et al.: 2011, *EAS Publications Series*, **45**, 449-452.