

Astrometry of Galactic Star-Forming Region IRAS 20126+4104 with VERA

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We report astrometric observation results of IRAS 20126+4104 with the VLBI Exploration of Radio Astrometry (VERA). The parallax was obtained to be 0.750 ± 0.092 mas, corresponding to a distance of $1.33^{+0.19}_{-0.15}$ kpc. We found IRAS 20126+4104 has a large peculiar motion of approximately 16 ± 4 km s⁻¹ which is originated with the expanding motions of the Cygnus superbubble. These results are published in Nagayama et al. (2015) [1].

IRAS 20126+4104 is associated with the Cygnus superbubble which is expected to be located near the Sun, and is extended over large angular size. Since the numerous sources at different distances from 0.4 to 4 kpc located along the line of sight direction of this superbubble [2], the measurement of the distance and proper motion by VLBI astrometry is important for studying the structures of this superbubble.

We made VERA observations of 22.235080 GHz H₂O masers in IRAS 20126+4104 during 2010–2011. IRAS 20126+4104 and a position reference source J2007+4029 were observed with VERA dual-beam system. The position of IRAS20126+4104 was measured using the phase-referencing method.

Figure 1 shows the measured parallax motion. We can find a sinusoidal motion a period of 1 year caused by a parallax. The parallax of IRAS 20126+4104 was measured to be 0.750 ± 0.092 mas, corresponding a distance of $1.33^{+0.19}_{-0.15}$ kpc. This is consistent with the parallax measured with VLBA [3].

The peculiar motion of IRAS 20126+4104 is estimated to be $(\Delta v_l, \Delta v_b, \Delta v_r) = (-3 \pm 4, 15 \pm 4, -11 \pm 4)$ km s⁻¹ from the observed proper motion of $(\mu_\alpha \cos \delta, \mu_\delta) = (-4.15 \pm 0.51, -4.07 \pm 0.51)$ mas yr⁻¹ and LSR velocity of $v_{\text{LSR}} = -3.5 \pm 4$ km s⁻¹. This peculiar motion of IRAS 20126+4104 appears to be associated with the expansion of Cygnus superbubble. The interpolated position of IRAS 20126+4104 ~ 3.6 Myr ago, which is the expansion time-scale of the Cygnus superbubble, is consistent with the center of OB type-stars's expanding motion observed with Hipparcos [4].

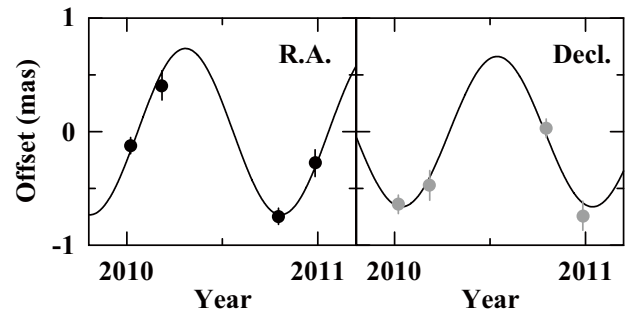


Figure 1: Parallax of IRAS 20126+4104.

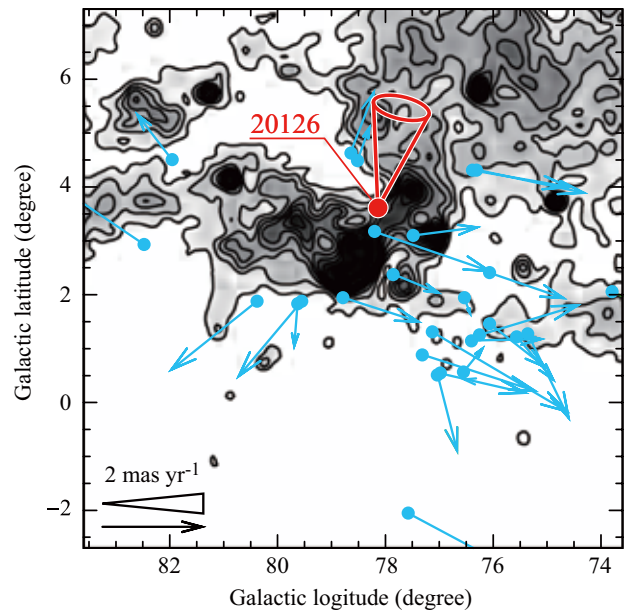


Figure 2: The peculiar motion of IRAS 20126+4104 (red cone). The blue arrows show the peculiar motions of OB type stars measured by Hipparcos [4]. The background contour shows the ROSAT 1/4 keV map of the Cygnus superbubble [2].

References

- [1] Nagayama, T., et al.: 2015, *PASJ*, **67**, 66.
- [2] Uyanker, B., et al.: 2001, *A&A*, **371**, 675.
- [3] Moscadelli, L., et al.: 2011, *A&A*, **526**, A66.
- [4] Comeron, F., Torra, J., Gomez, A. E.: 1998, *A&A*, **330**, 975.