

Near-Infrared Circular Polarization Images of NGC 6334-V

KWON, Jungmi, TAMURA, Motohide
(NAOJ/GUAS)

LUCAS, Phil W.
(University of Hertfordshire)

HASHIMOTO, Jun, KUSAKABE, Nobuhiko, KANDORI, Ryo
(NAOJ)

NAKAJIMA, Yasushi
(Hitotsubashi University)

NAGAYAMA, Takahiro
(Nagoya University)

NAGATA, Tetsuya
(Kyoto University)

HOUGH, James H.
(University of Hertfordshire)

We present results from deep imaging linear and circular polarimetry of the massive star-forming region NGC 6334-V (Figure 1). These observations show high degrees of circular polarization (CP), as much as 22 % in the K_S band, in the infrared nebula associated with the outflow. The CP has an asymmetric positive/negative pattern and is very extended ($\sim 80''$ or 0.65 pc). Both the high CP and its extended size are larger than those seen in the Orion CP region (Figure 2). Three-dimensional Monte Carlo light-scattering models are used to show that the high CP may be produced by scattering from the infrared nebula followed by dichroic extinction by an optically thick foreground cloud containing aligned dust grains. Our results show not only the magnetic field orientation of around young stellar objects, but also the structure of circumstellar matter such as outflow regions and their parent molecular cloud along the line of sight. The detection of the large and extended CP in this source and the Orion nebula may imply the CP origin of the biological homochirality on Earth [1].

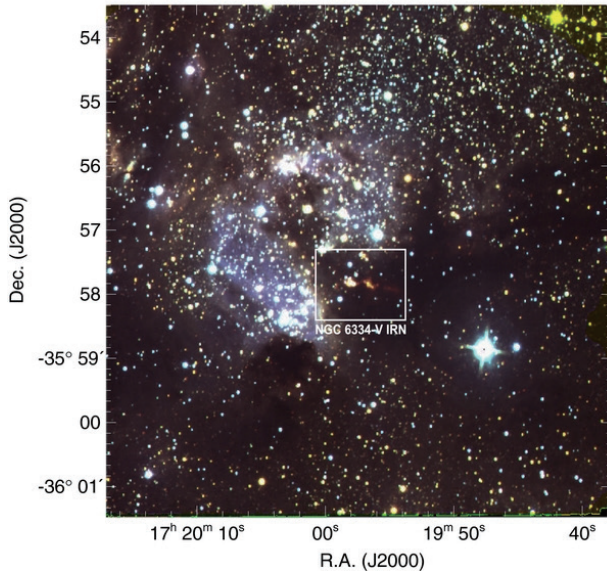


Figure 1: Color composite Stokes I image of the NGC 6334-V region in the J (blue), H (green), and K_S (red) bands from the IRSF/SIRPOL (CP) observations.

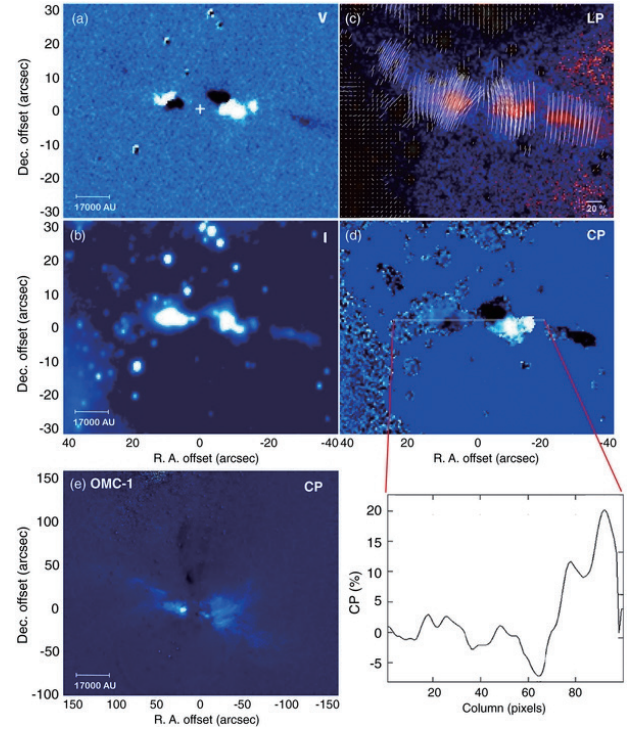


Figure 2: ((a) and (b)) Stokes V and I images of NGC 6334-V IRN in the K_S band, respectively. The white cross shown in (a) is the location of the illuminating star. (c) K_S polarization vector map of NGC 6334-V IRN superposed on the LP image. (d) CP image in the K_S band and a plot line indicated a white box and columns of the sub-CP image smoothed by 3 pixels of NGC 6334-V IRN. For making the CP image, I image was masked with a threshold of 2σ of approximate sky value. (e) CP image of OMC-1 in the K_S band.

Reference

[1] Kwon, J., et al.: 2013, *ApJ*, **765**, L6.