

Near-infrared and wide-field circular polarimetry of the Orion nebula and homochirality of life

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Terrestrial living material consists almost exclusively of one enantiomer, such as left-handed amino acids and right-handed sugars. The origin of such phenomenon, homochirality, is a longstanding mystery. This can be critical to understanding the origin and development of life. Enantiomeric excesses can be yielded under circularly polarized irradiation through asymmetric photochemistry. The possibility of astronomical sources for circular polarization in star-forming regions has been investigated.

In this study, we present a wide-field and deep near-infrared circular polarization image in the Orion nebula, using SIRPOL on the 1.4-m IRSF telescope at the South African Astronomical Observatory. In this region, massive stars and many low-mass stars are forming. Our results show that a highly circular polarization region is spatially extended around the massive star-forming region. We also present results of aperture polarimetry for numerous point-like sources. Based on these polarimetry results, we discuss the origin of homochirality.