

Circular Polarimetry of the Orion Nebula by SIRPOL

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Near infrared imaging circular polarimetry of the Orion nebula were obtained with the SIRIUS camera [1] and its polarimeter (SIRPOL) on the 1.4-m IRSF telescope at the South African Astronomical Observatory. We present a deep circular polarization (CP) image of the Orion nebula in the K_s band ($2.14\ \mu\text{m}$). Our results reveal that a high CP region is spatially extended ($\sim 0.4\ \text{pc}$) around the massive star-forming region, the Orion Becklin-Neugebauer(BN)/Kleinman-Low(KL) nebula [2]. The CP image clearly reveals the quadrupolar structure. On the other hand, other regions, including the linearly polarized Orion bar [3], show no significant CP. In the BN/KL region, we investigate the correlations of CP, linear polarization (LP), and $H - K_s$ color representing extinction [4]. $H - K_s$ color is well correlated with CP. We derive a simple relation between dichroic extinction, color excess, CP, and LP. The observed correlation between the Stokes parameters and the color excess agrees with the derived relation, and suggests a major contribution of dichroic extinction to the production of CP in this region, indicating the wide existence of aligned (non-spherical) grains.

Keywords: Polarization; dust; dichroic extinction.

References

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