

Complex Scattered Radiation Fields and Multiple Magnetic Fields in the Protostellar Cluster in NGC 2264

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Near-infrared (*JHKs*) imaging polarimetry has been carried out for NGC 2264 IRS 2 region in the Monoceros OB1 cloud, as one of the most extensive polarimetric studies on embedded protostellar clusters. Various clusters of infrared reflection nebulae associated with NGC 2264 IRS 2 and IRAS 12 S1 core were detected as well as local IRNe. The illuminating sources of the IRNe were identified with known or new near- and mid-IR sources. In addition, 314 point-like sources were detected in all three bands and their aperture polarimetry was studied. Using a color-color diagram, reddened field stars and diskless pre-main sequence stars were selected to trace the magnetic field (MF) structure of the molecular cloud. The mean polarization position angle of the point-like sources is 81° in the cluster core, and 58° in the perimeter of the cluster core. The CF method gives a rough estimate of the MF strength to be about $100 \mu\text{G}$. A comparison with recent numerical simulations of the cluster formation implies that the cloud dynamics is controlled by the relatively strong MF. The local MF direction is well associated with that of CO outflow for IRAS 12 S1 and consistent with that inferred from submillimeter polarimetry. In contrast, the local MF direction runs roughly perpendicular to the Galactic MF direction.