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A Multiwavelength Study of the Galactic Star Forming Region Associated with IRAS 20255+3712 / S 106

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Abstract. The Galactic star forming region associated with IRAS 20255+3712 / S 106 has been mapped simultaneously in 150 and 210 μm bands using the TIFR 1-metre balloon borne far-infrared (FIR) telescope with an angular resolution of 1 arc min. The presence of a disk of cold dust is inferred from these FIR maps. High sensitivity and angular resolution radio continuum imaging at 325, 610 and 1280 MHz carried out using the Giant Metrewave Radio Telescope (GMRT), demonstrates the morphological contrast between the emission from the ionized gas and the thermal dust emission. The emission from the carriers of Unidentified Infrared Bands (UIBs) in the mid infrared 6–9 μm as extracted from the Midcourse Satellite Experiment (MSX) survey (at 8, 12, 14 and 21 μm), compares rather well with the radio emission.

1. Introduction

IRAS 20255+3712 is associated with the bipolar H II region and the nebula S 106, located near the centre of a molecular cloud extending $\sim$ 25′ × 20′. The following facts make it a very interesting source for detailed study : the star exciting the nebula appears to be very young and still accreting matter; and a central dark lane possibly contains signatures of protostellar accretion disc (Richer et al. 1993, Bally et al. 1998). High velocity CO outflow has also been detected. Detection of lines of molecules like CS and NH_3 indicate the presence of high molecular densities.

2. Observations and Results

Balloon-borne far infrared (FIR) observations were carried out with the TIFR 1-m telescope, to detect thermal emission from the dust component (Verma et al. 2003). A region ~30′ × 30′ around IRAS 20255+3712 was mapped simultaneously in two bands with effective wavelengths

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of ~ 150 μm and 210 μm. Fig. 1 shows the intensity distribution around IRAS 20255+3712 at these FIR bands.

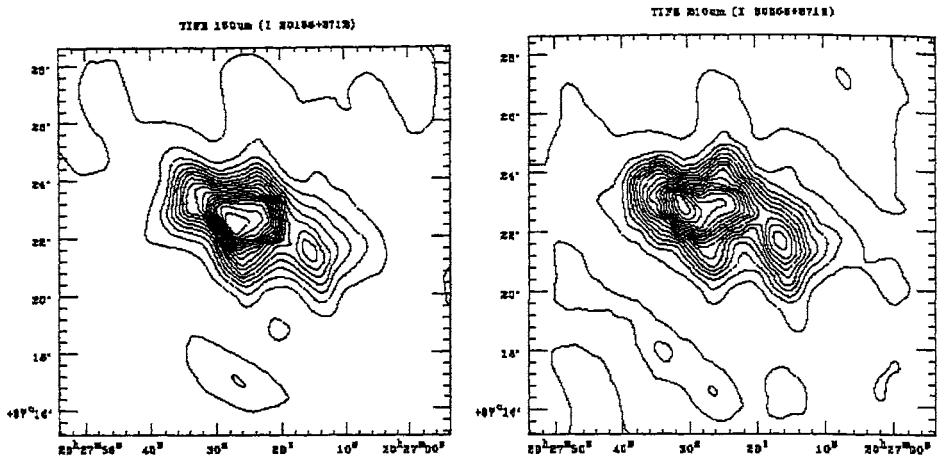

Figure 1. The intensity maps for the region around IRAS 20255+3712 in TIFR bands, 150 μm (left) and 210 μm (right), with peak values of 1390 & 630 Jy/sq. arcmin respectively. The abscissa and the ordinate are R.A.(J2000.0) and Dec.(J2000.0) respectively.

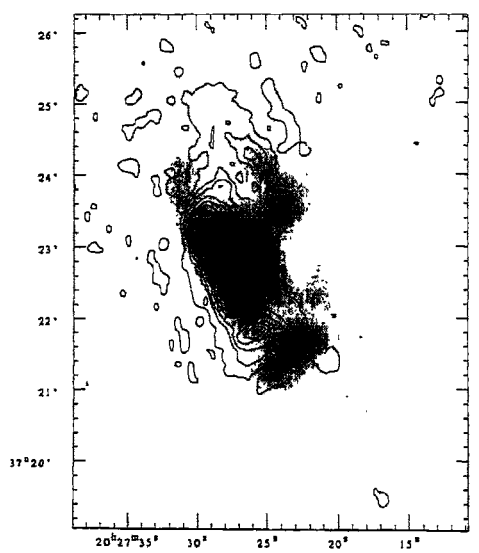

Figure 2. A comparison between the 610 MHz radio emission (contours) and the emission in UIBs (grey scale) for IRAS 20255+3712. The epoch of the abscissa and the ordinate are J2000.0.

The ionized gas within and around the H II region associated with IRAS 20255+3712 has been mapped at high angular resolution using the GMRT array, in three continuum bands at 325, 610 and 1280 MHz. We have used the MSX images in the 8, 12, 14 and 21 μm bands for the region around IRAS 20255+3712 to estimate the spatial distribution of warm interstellar dust, its temperature and emission in UIBs following Ghosh & Ojha (2002). A comparison between the spatial distribution of radio emission (610 MHz) and the emission in UIBs for IRAS 20255+3712 is presented in Fig. 2. The emission from the carriers of UIBs in the mid infrared 6–9 μm (possibly Polycyclic Aromatic Hydrocarbon, PAHs), compares very well with the 610 MHz map.

References

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