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A multiwavelength study of Galactic HII region S297

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Abstract. Sharpless 297 (S297), an optically visible classical HII region, at a distance of 1.1 kpc (Bica et al. 2003), is located in Canis Major. Here, we present the preliminary results of this Galactic HII region. Optical observations were carried out with the 2.01 m Himalayan *Chandra* Telescope (HCT), Hanle (Ladakh) and the 2 m IUCAA Girawali Observatory (IGO) telescope, Pune. Near-infrared (NIR) observations in JHK_s bands were taken with the 1.4 m IRSF telescope at South Africa. The radio continuum observations were carried out with the GMRT at 1280 MHz and 610 MHz.

Keywords : star: formation - HII region: triggered star formation

1. Analysis

Figure 1 shows the HCT *R* band image of the region around S297. The spectral type of the central ionising star HD 53623 was determined to be B0V, from the HCT and IGO optical spectra. The Hα emission line sources were identified using the HCT grism slitless spectra. NIR colour-colour ($J-H/H-K$) diagram was used to identify the Class II sources in our field. The colour-magnitude diagram ($H-K/K$) yielded 28 sources with H-$K > 1$, which are presumably the young pre-main-sequence stars (Class I). Radio continuum results, on fitting to the model given by Mezger & Henderson (1967), give an electron density of 788±107 cm^{-3}, suggesting an evolved HII region. A calculation of Lyman continuum luminosity gives the spectral type of B0V to B0.5V for the central star, in agreement with the optical spectroscpic estimation.

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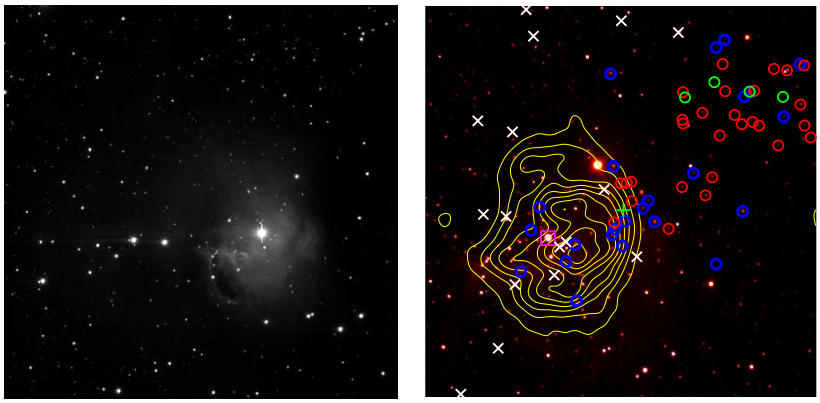

Figure 1. (*left*) HCT *R* band image (∼ 10'×10') of the region around S297 centered on α_{2000} = $07^h05^m23^s$, δ_{2000} = $-12°17'59''$. (*right*) JHK_s colour composite image of the region centered on α_{2000} = $07^h05^m11^s$, δ_{2000} = $-12°18'52''$. The Class I sources have been marked in red circles and the Class II sources are shown in blue circles. The white crosses denote the position of Hα emission line stars. The radio contours for 1280 MHz have been overplotted. The central ionising star is shown in a magenta square. The location of the young protostar found by Forbrich et al. (2009) is marked with a green plus symbol. Recent Herschel observations (Linz et al. 2010) have found new cool, compact sources towards the north-west, which are marked here in green circles. The field-of-view is 7.8'×7.8'.

2. Star formation scenario

The radio morphology suggests that the ionised gas is undergoing a champagne flow, with the extended emission towards the east, and the head of flow located in the west towards the cold, dark cloud LDN 1657A. Forbrich et al. (2009) have found 2 deeply embedded, very young sources of intermediate mass, driving a high-velocity bipolar CO outflow at the interface of the HII region and the dark cloud. The Class II and Class I young stellar objects (YSOs) seem to align from south-east to north-west. The majority of the Hα emission sources are found to be associated with the ionised gas, whereas the Class I source are found to be concentrated towards the north-west. The distribution of the YSOs in the region is a probable indication of the triggered star formation, propagating from the ionising source towards the north-west. A detailed study of the region is underway.

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