

Isolated infrared nebula (IRAS 16148-5011) and evidence of triggered star formation

S. S. Borgaonkar^{1*}, D. K. Ojha¹, T. Nagayama², M. Tamura³,
S. K. Ghosh¹ and M. R. Samal⁴

¹*Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba,
Mumbai 400 005, India*

²*Department of Astronomy, Kyoto University, Kyoto 606-8502, Japan*

³*National Astronomical Observatory of Japan, 2-21-1 Osawa, Mitaka,
Tokyo 181-8588, Japan*

⁴*Aryabhata Research Institute of Observational Sciences, Nainital 263 129, India*

Abstract. We present a near-infrared (NIR) and radio study of IRAS 16148-5011 star forming region (SFR). This nebula was accidentally identified in the K -band, during the survey of the Galactic plane for obscured galaxies, with 1.4-m InfraRed Survey Facility (IRSF) telescope in 2004. It is located near the Galactic plane ($l = 333.05^\circ$, $b = +0.04^\circ$) and is isolated within an area of $\sim 22' \times 22'$ on the sky. This is an active SFR as revealed from NIR and radio data and is a good example for studying the isolated star formation in our Galaxy.

Keywords : stars: formation – ISM: HII regions – triggered star formation

1. Introduction

IRAS 16148-5011 is an H II region situated close to the RCW 106 star forming complex at a distance of ~ 3.6 kpc (Lockman 1979). Molinari et al. (2008) and Karnik et al. (2001) detected this source as part of their survey of Galactic SFRs. For our study, we have used JHK NIR observations from the 1.4-m IRSF telescope and also used the archival data from *Spitzer* IRAC & MIPS bands and MOST Galactic Plane Survey. Fig. 1 (*left*) shows the location of

*email: ssborgaonkar@tifr.res.in

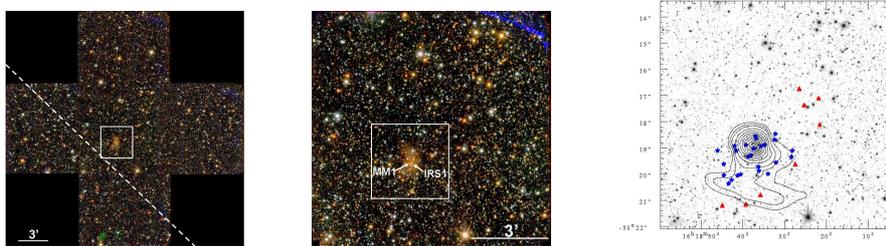


Figure 1. (*left*) *JHK* color mosaic image of IRAS 16148-5011 region. The white box shows the location of the infrared nebula. The dashed line shows the position of the Galactic plane. (*middle*) Enlarged view of the IRAS region. MM1 is the mm source. IRS1 is the ionising source of the H II region identified in our study. (*right*) *K*-band image overlain with the 843 MHz radio contours. The blue asterisks are T Tauri stars and red triangles are Class II YSOs.

IRAS 16148-5011 on the sky. The positions of the mm source (MM1) and the probable ionising source (IRS1) of the H II region are also shown in Fig. 1 (*middle*).

2. Analysis

We identified T Tauri stars using the NIR color-color (CC) diagram. Using pre-main-sequence isochrones from Palla & Stahler (1999), we estimated the age of these sources to be less than 1 Myr. We have also extracted Class I/II type young stellar objects (YSOs) using IRAC CC diagram. The distribution of these sources is shown in Fig. 1 (*right*). Using the 843 MHz radio data, we calculated the dynamical age of the H II region and the spectral type of the ionising source IRS1. We have modeled the spectral energy distribution (SED) (Robitaille et al. 2007) of IRS1 source; the SED fit of IRS1 is consistent with a massive YSO of ~ 14 solar masses with an age of ~ 0.6 Myr.

3. Summary

We find that IRS1 is the probable ionising source of the H II region, which is a zero-age-main-sequence star of O9 - B0 spectral type. The dynamical age of the H II region is estimated to be ~ 0.5 Myr. The spatial distribution of Class II YSOs and assuming the lower limit of their ages (few times 10^5 Myr) with respect to the age of the ionising star (keeping in mind the uncertainties involved in the age estimation) indicates that a tentative evidence of triggered star formation can not be ignored. Spectroscopic observations may give us a clear view of star formation activity of the region.

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