

*Interstellar Matter and Star Formation:
A Multi-wavelength Perspective*
ASI Conference Series, 2010, Vol. 1, pp 233–235
Edited by D. K. Ojha

Multi-wavelength study of the young cluster NGC 1624

J. Jose^{1*}, A. K. Pandey¹, K. Ogura², D. K. Ojha³, B. C. Bhatt⁴,
M. R. Samal¹ and N. Chauhan¹

¹*Aryabhata Research Institute of Observational Sciences, Nainital, 263129, India*

²*Kokugakuin University, Higashi, Shibuya-ku, Tokyo 150-8440, Japan*

³*Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba,
Mumbai 400 005, India*

⁴*Indian Institute of Astrophysics, Koramangala, Bangalore 560 034, India*

Abstract. We present preliminary results of deep optical and near-infrared observations of the young cluster NGC 1624 associated with the H II region Sh2-212. Basic parameters of the cluster, young stellar population, initial mass function and K-band luminosity function have been discussed in this paper.

Keywords : stars: luminosity function, mass function - stars: pre-main-sequence - young clusters: individual: NGC 1624

1. Introduction

NGC 1624 is a young cluster associated with the H II region Sh2-212. Deharveng et al. (2005) have identified Sh2-212 as a likely candidate for the collect and collapse mode of star formation. The sign of ‘Champagne flow’ in this region (Deharveng et al. 2008) makes this object an ideal target to study the initial mass function (IMF) in extreme star forming conditions.

2. Analysis and results

We obtained deep optical photometry in the *UBVRI* bands from the 2-m Himalayan Chandra Telescope, Hanle and the 1-m *Sampurnanand* Telescope,

*e-mail: jessyvjose1@yahoo.com

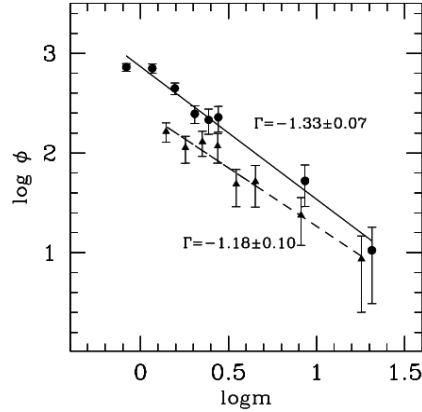


Figure 1. The MF derived using optical (dashed line) and NIR (solid line) data. The MF slopes obtained are also given.

Nainital. The deep *JHK* near-infrared (NIR) observations using CFHT-IR of the 3.56-m CFHT were obtained from the CADC's archive program. The reddening ($E(B - V)$) towards the direction of the cluster is obtained using the U-B/B-V colour-colour (CC) diagrams and found to vary between 0.76 to 1.00 mag. The post-main-sequence age and distance of the cluster are obtained by fitting isochrones by Girardi et al. (2002) to the observed distribution of stars in colour-magnitude diagrams (CMDs) and are found to be $\sim 2 - 4$ Myr and $6.1_{-0.6}^{+0.8}$ kpc, respectively. Low resolution spectral analysis identifies the ionizing source of Sh2-212 as a massive star of spectral class O6.5V. Using NIR CC diagram, we identified 120 candidate young stellar objects (YSOs) with NIR excess. This number yields a lower limit of NIR excess fraction of 20%. The CMD of these YSOs indicates an age spread of $\sim 1 - 5$ Myr suggesting non-coeval star formation in NGC 1624. However, we did not find any age sequence in the spatial distribution of YSOs.

The number of probable cluster members has been determined by statistically subtracting the field star contribution from the cluster region. The masses of the probable cluster members are obtained using the main-sequence and pre-main sequence isochrones by Girardi et al. (2002) and Siess et al. (2000), respectively. The mass functions thus derived using optical and NIR data are shown in Figure 1. The slope of the mass function (MF) Γ from optical data, in the mass range $1.2 \leq M/M_{\odot} < 27$, can be represented by -1.18 ± 0.10 . Whereas the NIR data, in the mass range $0.65 \leq M/M_{\odot} < 27$, yields $\Gamma = -1.33 \pm 0.07$. Thus the MF fairly agrees with the Salpeter value (-1.35). The slope of the *K*-band luminosity function for the cluster is found to be 0.30 ± 0.06 which agrees well with the values obtained in our earlier studies on young clusters (Pandey et al. 2008, Jose et al. 2008).

References

- Deharveng L., Zavagno A., & Caplan J., 2005, *A&A*, 433, 565
Deharveng L., Lefloch B., Kurtz S., et al., 2008, *A&A*, 482, 585
Girardi L., Bertelli G., Bressan A., et al., 2002, *A&A*, 391, 195
Jose J., Pandey A.K., Ojha D.K., et al., 2008, *MNRAS*, 384, 1675
Pandey A.K., Sharma S., Ogura K., et al., 2008, *MNRAS*, 383, 1241
Siess L., Dufour E., & Forestini M., 2000, *A&A*, 358, 593