

ON THE PRE-MAIN SEQUENCE STARS OF THE
STAR FORMING REGION NGC 7000/IC 5070C. Chavarría-K.^{1,2}, L. Terranegra¹, J.M. Alcalá, and L. Neri²

In order to derive T_{eff} and $\log g$ of stars associated with NGC 7000/IC 5070 (Herbig 1958; Cohen and Kuhl 1979), 21 stars in the region were observed in the $uvby-\beta$ photometric system. No clear main sequence is observed in the $(v, b-y)$ diagram. A ZAMS reddened with a mean extinction law (A_v and R) given by Cohen and Kuhl (1979), and at a distance of $d = 700$ pc was adopted. All stars except V751 Cyg lay to the right of the ZAMS. A reddening free $[c_1] - [m_1]$ diagram suggests that most of the stars in the sample (14 in number) are hot-intermediate hot, and the rest (7 stars) are yellow-red. Apparently, the $[c_1] - [m_1]$ diagram works for the late stars; while the early type stars fall to the right of the expected loci in the diagram. This is probably due to: a) the adopted i.s. extinction is not representative to the region, and b) anomalous circumstellar extinction. The two colour $(H-K) - (K-L)$ diagram of stars with IR data available supports the latter. The loci of the data in the two colour IR diagram coincides with that of the pre-ms Orion population stars.

About half of the stars show variability, since the standard deviations of the V magnitude are greater than that of the non-variable stars ($\sigma_V \approx 0.02$). Probable variable stars are V517 Cyg ($\sigma_V = 0.22$), LkH α 168 ($\sigma_V = 0.04$), V521 Cyg ($\sigma_V = 0.14$), LkH α 183 ($\sigma_V = 0.30$), and AS442 ($\sigma_V = 0.35$). Variability is also observed in the β -index.

We find that V751 Cyg is probably a hot subluminoous foreground or a hot background variable not associated with the region. For LkH α 168 we found a spectral type F8-G0; it also has a warm circumstellar dust envelope of ≈ 1000 K. The star shows signs of photometric variability. All this indicates that LkH α 168 is more probably a T Tauri star, and not a background object. The FU Ori star V1057 Cyg has at present $V = 14.04$ and a spectral type later than F8.

In conclusion, the objects observed in NGC 7000/IC 5070 are pre-ms stars: the early type stars of the sample agree with the criteria defining Herbig emission stars, while the later type objects check with those for T Tauri stars. From the $H\beta$ photometry we have indications of variability in the hydrogen lines.

This study was partially supported by Consejo Nacional de Ciencia y Tecnología, México (grant P228-CCO X880202).

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 $uvby-\beta$ AND NEAR INFRARED PHOTOMETRY
OF NGC 7380C. Chavarría-K.^{1,2}, E. de Lara³, H. Hernández²,
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We discuss the results of the $uvby-\beta$ and $JHKLM$ photometry of 25 bright stars in the field of Sh2-142/NGC 7380. From the optical photometry and a two colour synthetic grid based on Relyea and Kurucz (1978, *Ap. J. Suppl.*, **37**, 45) we obtain T_{eff} , $\log g$, and $E(B-V)$ for the different stars. From the $(V, b-y)$ and the $([m_1], [c_1])$ diagrams, 8 foreground stars were eliminated from the sample. The remaining stars have a uniform extinction with $E(B-V) = 0.77 \pm 0.02$. For the conspicuous star LSIII 57°89 associated with a very bright nebulosity, we found a spectral type B0 ($T_{\text{eff}} \approx 30000$ K). The star is hot enough to ionize the local bright nebulosity, and could be triggering local star formation as is the case of NGC 2175 bright knot Sh2-252 a+b. Infrared CCD observations of LSIII 57°89 should be appropriate. From experience with this and other regions (e.g., NGC 7000/IC 5070 in this poster session), problems with the observed and synthetic colours $[m_1]$, $[c_1]$ have been detected, specially $[m_1]$ which is more reddened for our stars. Therefore, luminosity classes were not derived but assumed equal to V. This is consistent with the age $2-3 \cdot 10^6$ yr of the cluster.

Together with the infrared photometry, we measure a visual extinction $A_V = 2.01 \pm 0.18$ and a total to selective extinction ratio $R = 2.65 \pm 0.16$ for the region, the extinction law being normal. The distance modulus to the region was also derived. According to Underhill (1969, *Astr. and Ap.*, **1**, 356), at least 1/3 of the stars are double. Ignoring this fact a lower bound to the distance value of 2540 ± 300 pc was found. If the components are assumed equally bright for the double stars, a better value 2900 ± 250 pc is derived. Note that earlier (photometric) distances omit this consideration.

This study was partially supported by Consejo Nacional de Ciencia y Tecnología, México (grant P228CCOX-880202).

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