

# AN OBSERVATIONAL STUDY OF THE STAR FORMING COMPLEX Sh2-155/CEPHEUS OB III

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From near IR data presented here and optical *UBV* and *uvby- $\beta$*  photometry given in the literature of about 40 stars of Blaauw (1964) subpopulations (a) and (b), and of "field stars" (membership after Garmany 1973) we found for the Cepheus OB III association, the following: a distance  $d = 851 \pm 64$  pc (spectral types from Garrison 1978), a mean visual extinction  $(A_V)_a = 2.1$  and  $(A_V)_b = 2.9$ , the total to selective extinction ratio  $A_V/E(B-V) = 3.0 \pm 0.1$ . In an attempt to detect infrared counterparts to radio sources in the region (Felli *et al.* 1978), more than 50 (mostly weak) infrared sources were found, most probably pre-main sequence low mass stars. AFGL 3000 is a B0 V star with (reflection) nebulosity, extinguished in the visual by  $11.6^m$ , with (1950 epoch)  $\alpha = 22^h55^m36^s$  and  $\delta = +62^\circ 22' 17''$  (uncertainty  $\leq 6''$ ). Besides star BHJ 41, the O7nf star exciting the region, stars BHJ 10, 36 and 54 are associated with radio sources (Felli *et al.* 1978; Panagia and Thum 1981). Our data of BHJ 36 is consistent with a late spectral type for the star. CCD imagery (*BVRI* -  $H\alpha$  passbands) of the bright  $H\alpha$  knot in Sh2-155 revealed about 90 pre-main sequence stars (about 50% with  $H\alpha$  in emission) embedded in the knot, suggesting a stellar density  $\approx 1700$  stars  $\text{pc}^{-3}$  in the region. All trapezium stars are Herbig emission stars.

From Fabry-Pérot interferometry we find a radial mean velocity to the region  $(V_r)_{lsr} = -15.0 \text{ km s}^{-1}$  ( $d_{kin} = 790 \pm 60$  pc), and a radial velocity gradient in the N-S direction  $-5 \text{ km s}^{-1}$  due to rotation of the cloud. This gives a mass estimate of the molecular cloud  $\geq 2 \times 10^3 M_\odot$ . With an improved version of the blister model by Panagia and Thum (1981), we are able to explain all optical + radio properties in Ceph B/Sh2-155 without evoking collapse of the molecular cloud. A more detailed report of our results will be published elsewhere.

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# AN OBSERVATIONAL STUDY OF SELECTED PECULIAR STARS IN NGC 2264. I: STROMGREN *UVBY- $\beta$* AND NEAR INFRARED PHOTOMETRY

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We present results of a *uvby- $\beta$*  and near IR quasi-simultaneous photometric study of more than 40 peculiar stars in the young open cluster NGC 2264. The peculiar stars have been usually divided into four groups: below main-sequence stars (BMSS), subluminoous red giants (SRGS), infrared flux-deficient stars (IRFDS) and blue-veiled stars (BVS). We find that the BMSS and the SRGS are objects not selectively but heavily obscured at optical wavelengths by optically thick circumstellar dust envelopes, the envelope thermal radiation being comparable to or larger than the photospheric stellar flux at infrared wavelengths. BMSS lie above or on the main-sequence if we suppose the K magnitude nearly unaffected by extinction, and if we apply the bolometric corrections given by their  $T_{eff}$  derived from our photometry. We expect second order corrections to make the stars more luminous. This result should be complemented with observations at longer wavelengths (L and M passbands). Similarly, SRGS are shown to be  $1^m - 3^m$  more luminous, but not as bright as normal red giants. The derived bolometric luminosities for these two groups are similar to those for T Tauri stars, except in the case of W90 ("W" from Walker 1956, *Ap. J. Suppl.*, 2, 365) which is a Herbig Ae/Be star with  $L \approx 270 L_\odot$ .

On the other hand, our data do not confirm the infrared flux deficiency in the spectral energy distribution of several stars in NGC 2264 reported by Warner, Strom, and Strom 1977, *Ap. J.*, 213, 427). We found instead a slight IR excess. We give arguments that suggest a calibration problem in the L-fluxes of Warner *et al.* supported by our observations.

Our final goal will be to relate these anomalies to the evolutionary stages of the several groups of stars in the cluster.

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