INFRARED AND VISUAL OBSERVATIONS OF h AND χ PERSEI

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Near-infrared observations of 82 stars in h and χ Persei (NGC 869 and 884) were obtained with the Mexican National Observatory infrared photometer/spectrometer on the 2.1 m telescope at San Pedro Mártir, Baja California. The JHK photometry covers most of the stars in the upper main sequence of the central parts of the clusters as well as the giants and supergiants in a more extended region, with additional L' and M measurements of the brightest members. In Figure 1 the (J-H) vs (H-K) and (H-K) vs (K-L) diagrams are presented. In order to complement the available good quality UBV photometry, we carried out photoelectric measurements of 23 stars in our sample for which only low quality photographic data has been published. These observations were made with the pulse-counting photometer attached to the newly refurbished 1.5 m telescope at San Pedro Mártir.

From the infrared data alone, we find a unique value for the extinction in the direction of both clusters and for stars of all luminosity classes, with an average value of E(J-K) = 0.28 ± .01 which, by assuming a reddening law given by van de Hulst's curve No. 15 (Johnson, 1968) gives A_V = 1.85 ± .12. This result is in excellent agreement with Crawford et al. (1970). Comparisons with the infrared and visual data suggest that the observed dispersion towards large values of E(B-V) is not due to variable reddening as stated by Wildey (1964), but it may be intrinsic to the atmosphere of some B-type stars.

From their infrared characteristics we found two clearly distinguishable groups of B supergiants: those with no infrared excess up to 4 μm which turn out to be the less luminous and five stars of luminosity class Ia with excess emission at $\lambda > 2$ μm. The shape of these excesses is interpreted as arising due to Bremsstrahlung emission from hot gas in strong stellar winds.

Most of the Be stars in χ Persei present significant infrared excesses. In most cases, this appears to be dominantly Bremsstrahlung emission from their hot envelopes while a fraction of stars can better be modelled by a component of thermal emission from circumstellar dust.

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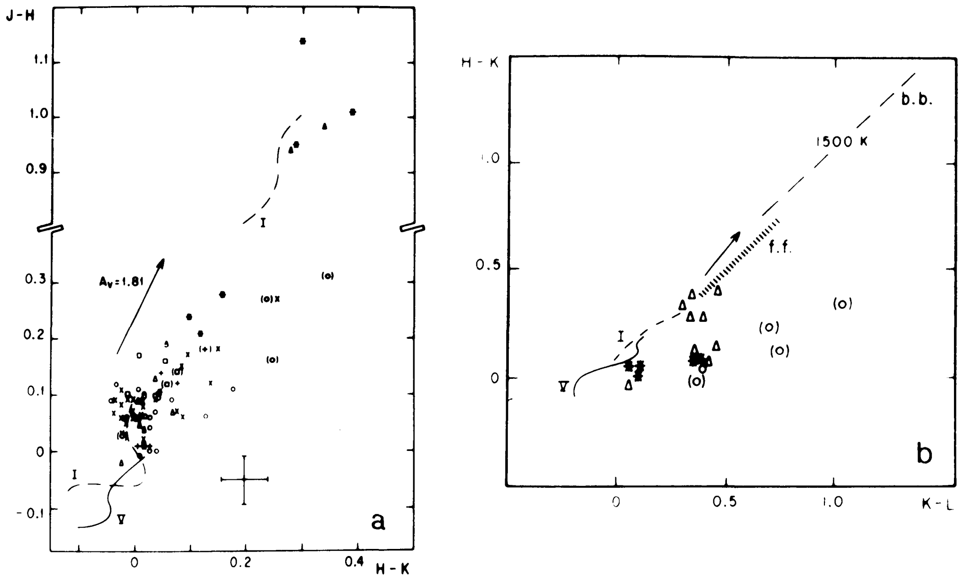

Figure 1. (a) (J-H) vs (H-K) diagram of all stars observed.
(b) (H-K) vs (K-L) diagram of the brightest stars.
Symbols are as follows: (x) dwarfs, (+) giants, (*) supergiants in h Persei; (o) dwarfs, (□) giants, (Δ) supergiants in χ Persei. Parentheses denote emission line spectra.

The well defined turn-off points in the individual H-R diagrams of h and χ Persei from the present observations and the presence of cooler blue supergiants in χ Persei support Schild's (1967) suggestion that h Persei is younger, by a factor of two in age, than χ Persei. The presence of a number of Be and peculiar stars in the nucleus of the latter cluster, which are absent in h Persei, points in the same direction.

The details of the present work will be published in the Revista Mexicana de Astronomía y Astrofísica.

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