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UBVRI POLARIMETRY OF STARS IN CARINA CLUSTERS

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RESUMEN

Se presentan resultados polarimétricos obtenidos en las bandas *UBVRI* de 75 probables miembros de los cúmulos Tr 14, Tr 15, Tr 16 y Cr 228. Los datos se obtuvieron con el sistema polarimétrico PISCO en el telescopio de 2.2-m del ESO en La Silla. Se estudian las propiedades de polarización del polvo interestelar e intracúmulo que parecen ser extremadamente anómalas.

ABSTRACT

Polarimeric results in the *UBVRI* bands of 75 likely members of the clusters Tr 14, Tr 15, Tr 16 and Cr 228 are presented. The data were collected with PISCO on the ESO 2.2-m telescope at La Silla in order to investigate the polarization properties of the anomalous intracluster dust.

Key words: **DUST, EXTINCTION**

The ESO Polarimeter with Instrumental and Sky COmpensation (PISCO) was used at the 2.2-m telescope on La Silla in March 1991 to obtain *UBVRI* polarimetric data of 76 stars in the Tr 14, Tr 15, Tr 16 and Cr 228 clusters within the boundaries of the Carina Nebula. The data were reduced using the MIDAS package at La Silla and further processed at UNAM.

The polarization measures were corrected for instrumental polarization, deadline effects, and for errors using the method of Serkowski (1974). The resulting *UBVRI* values have been fitted with the general interstellar polarization law which has the form

$$p/p_{\max} = \exp\,[-K\ ln^2(\lambda_{\max}/\lambda)]\ .$$

For the present work, a constant value $K = 1.15$ was used, which determines the "width" of the resulting distribution, although $K = 1.85K\lambda_{\max}$ has also been used (Serkowski, Mathewson, & Ford 1975).

Figure 1 shows a plot of $R_V = E_{V-K}/E_{B-V}$ versus $\lambda_{\max}$ for the stars in the four clusters (shown with different symbols). The solid line is the best fit of Whittet & van Breda (1978) to a set of galactic stars in different "normal" environments. The values of R_V were taken from Tapia et al. (1988). The average galactic values are $R_V = 3.1$ and $\lambda_{\max} = 0.57$. From our sample, only the stars in Tr 15 present a normal polarimetric behaviour. It is not surprising that Tapia et al. (1988) found this cluster to be the only one of the four with no anomalous photometric reddening characteristics.

The fact that there is no correlation between R_V and $\lambda_{\max}$ implies that the grains causing the extinction are not the same grains causing the polarization, as also concluded by Marraco, Vega, & Vrba (1993). One possible cause of this is the modification of the grain size distribution at a small scale in these clusters (except Tr 15) by shock waves travelling outward from the η Carinae central object, as modelled by Seab & Shull (1983).

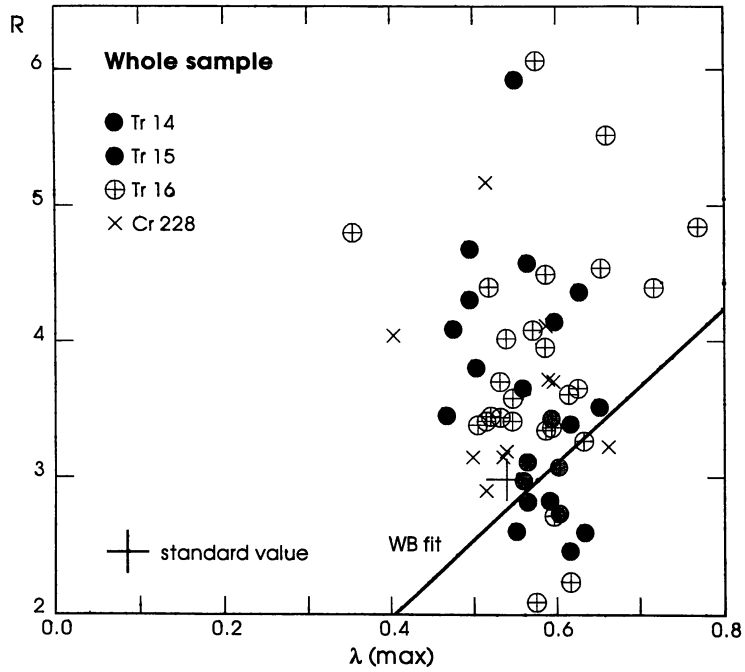

Fig. 1. Plot of $R_V = E_{V-K}/E_{B-V}$ versus λ_{max}

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