

# THE PHOTOSPHERE OF PLEIONE(\*)

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**Abstract.** In this paper we report results concerning the photospheric Balmer discontinuity of Pleione. They show that after the Be  $\rightarrow$  Be-shell phase transitions, the stellar photosphere keeps its characteristics unchanged.

## 1. Introduction

The energy distribution around the Balmer discontinuity (BD) gives us informations on the emission or absorption power of the Be phenomenon, and on the photosphere of the underlying star. Two BD's are seen in Be stars: one is variable, it may be in emission or in absorption and it is due to the circumstellar envelope; the other one resembles that of a normal B star and doesn't show any change within the observational uncertainties:  $\delta D \leq 0.02$  dex (Divan 1979). The observed value of the stellar BD ( $T_{eff}$ -indicator) as well as its mean position (log g-indicator) are the same after the characteristic Be "phase" variations (Zorec 1986).

## 2. The observations

Pleione (HD 23862) has been observed in the BCD (Barbier-Chalonge-Divan) spectrophotometric system since 1951 (Zorec 1986). The BCD observations were unfortunately done only during Be-shell phases. Meanwhile, the star has however shown at least two Be phases. The mean value of the photospheric BD and its mean position  $\lambda_1 - 3700$  are:  $D_* = 0.369 \pm 0.010$  dex and  $\lambda_1 - 3700 = 53 \pm 1 \text{ \AA}$  (observation dates: Nov. 51, Nov. 77, Jul. 80, Nov. 80, Nov. 81). Note the constancy of  $D_*$  and of  $\lambda_1 - 3700$ ! These values give: spectral type : B7-8 IV-V;  $T_{eff} = 11820 \pm 270$  K;  $\log g = 3.96 \pm 0.09$ ;  $R/R_\odot = 3.17 \pm 0.14$ ;  $M/M_\odot = 3.35$  (Divan and Zorec 1982, Zorec 1986). In Fig. 1 are shown the BCD spectrophotometric and some photometric observations of Pleione [UBVRI system (Johnson et al. 1966), UBV system (Sharov and Lyutiy 1972), Geneva system (Rufener priv. comm.), 13-colours (Johnson et al. 1967)] transformed to the total BD:  $D = D_* + d_{cs}$  (stellar + circumstellar components) and to the gradient  $\Phi_{rb}$  ( $\lambda\lambda 0.4 - 0.6\mu$ ). The difference between the BCD gradients and those obtained from photometry is due to the shell-line crowding which produces redder photometric colours. Note the constancy of the V mag. and that of the  $\Phi_{rb}$  gradient in spite of the strong and variable absorption in the circumstellar component of the BD.

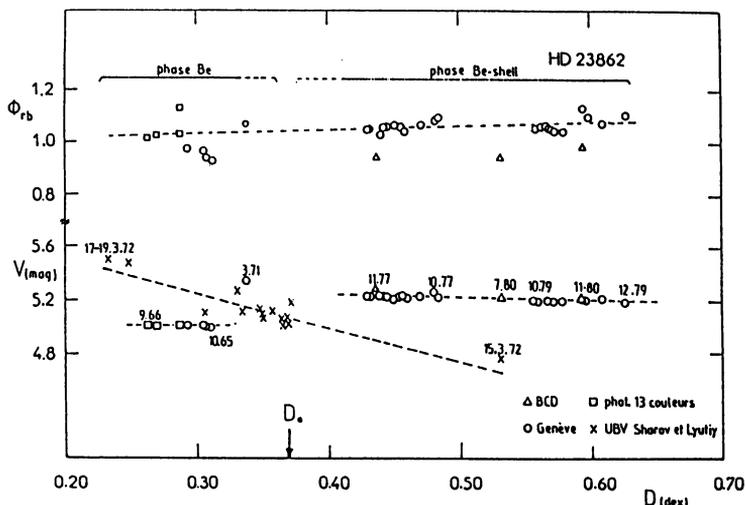


Fig. 1. Gradient  $\Phi_{r,b}$  and the V magnitude against the total BD of Pleione:  $D = D_* + d_{cs}$ . Points of 65-66 are for a Be phase. Points of 71-72 correspond to a Be  $\rightarrow$  Be-shell transition. Since 77 points are for a Be-shell phase.  $D_*$  is the photospheric BD.

### 3. Conclusion

The photosphere of Pleione seems to remain the same after two phase changes of the type Be  $\rightarrow$  Be-shell. The remarkable constancy of the stellar component of the BD as well as its position indicates that the phase variations leaves the stellar photosphere unchanged. Hence, the observed photometric changes have to be produced by a variable exophotospheric structure. It can be shown that changes of the geometry, size and temperature of the circumstellar envelope may explain the observed photometric variations during a phase transition (Zorec et al. 1989, Zorec and Briot 1991).

(\*) *Observations obtained at the ESO, La Silla, Chile and at the OHP, France*

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