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VARIABLE SHELL STRENGTH OF PLEIONE (BU Tau)

The peculiar shell star Pleione (28 Tau, B 8 V) is the most interesting Be star. This star has been the subject of a number of investigations, possessing the very long recorded spectroscopic history. Since 1880, this fascinating object has undergone through different phases (Be ——> B ——> Shell ——> Be ——> Shell). This star showed the Be phase from 1888 to 1903 (Pickering, 1889-90; Merrill, 1953). The observations from 1905 to 1936 revealed it to be a normal B star (Frost, 1906; Merrill, 1953). From 1938 to 1954 this star experienced a strong shell phase with maximum shell intensity during 1945-46 (McLaughlin, 1938; Mohler, 1938; Struve and Swing, 1943; Merrill, 1953).

From 1954 a new Be phase started for Pleione which persisted till 1972, with maximum intensity during 1960-1963 (Delplace and Hurbert, 1973; Morgan et al., 1973). The last shell phase of Pleione, which is still persisting, started in 1972 (Gulliver, 1973). Since 1972 the shell strength, as derived from lines, was found continuously increasing (Hirata and Kogure, 1976, 1977, 1978; Katahira and Hirata, 1984).

This shell star possesses unusual large Balmer jump implying strong near-ultraviolet deficiency. Goraya (1985) analysed the behaviour of its Balmer jump from 1975 to 1981. In the present study we have combined our new spectrophotometric measurement of the continuum ($\lambda\lambda$3200-5500 Å) with earlier observations (Goraya, 1984). We have investigated the variation of the shell strength as derived from the flux deficiency at the Balmer continuum in the near-ultraviolet region.

The present observations were made during 2 November, 1982 in the wavelength range $\lambda\lambda$3200-5500 Å. We used a Hilger and Watts scanner at the cassegrain focus (f/13) of 104-cm reflector of Uttar Pradesh State Observatory,

Nainital. An exit slit admitting 50 Å of the spectrum was used. The photomultiplier EMI 9658B and standard dc techniques were employed for detecting and recording the signal.

The instrumentation and observational procedures are described by Goraya (1985). Along with Pleione, the comparison star 18 Tau (B 8 V) and the standard star α Leo were also observed. The observations of Pleione and 18 Tau were reduced to standard magnitudes with the help of the standard stars; absolute calibration given by Taylor (1984). The standard deviation of the measurements is $\pm$ 0^m.03.

The differential magnitudes (Δm) of Pleione (Pleione-18 Tau) were computed and are compared with earlier measurements as shown in Figure 1.

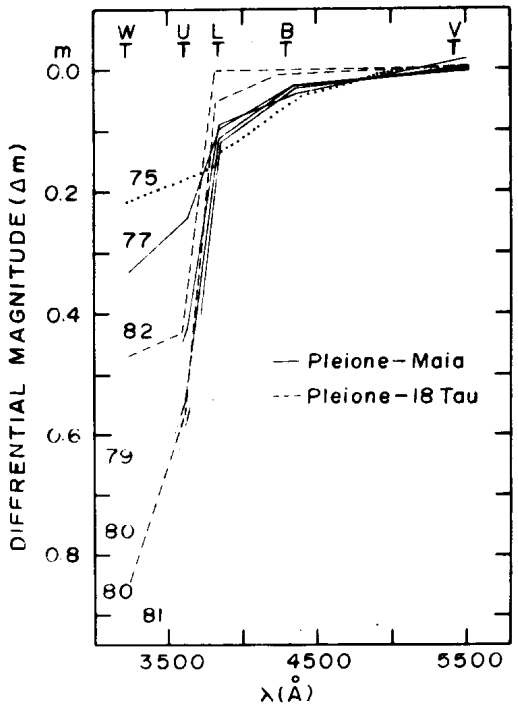

Figure 1: Variation of Balmer jump in Pleione

It is obvious that since 1975 there is a gradual increase in differential magnitudes of Pleione. The highest value reached during 1981, followed by a rapidly decreased value during 1982. This shows that the shell strength of Pleione increased gradually from 1975 to 1981 followed by a sharp decrease onwards. To understand the variation of the shell strength better, we have also plotted the differential magnitudes of Pleione at two wavelengths i.e. Δm_{3300} and Δm_{3600}, as a function of time (cf. Figure 2).

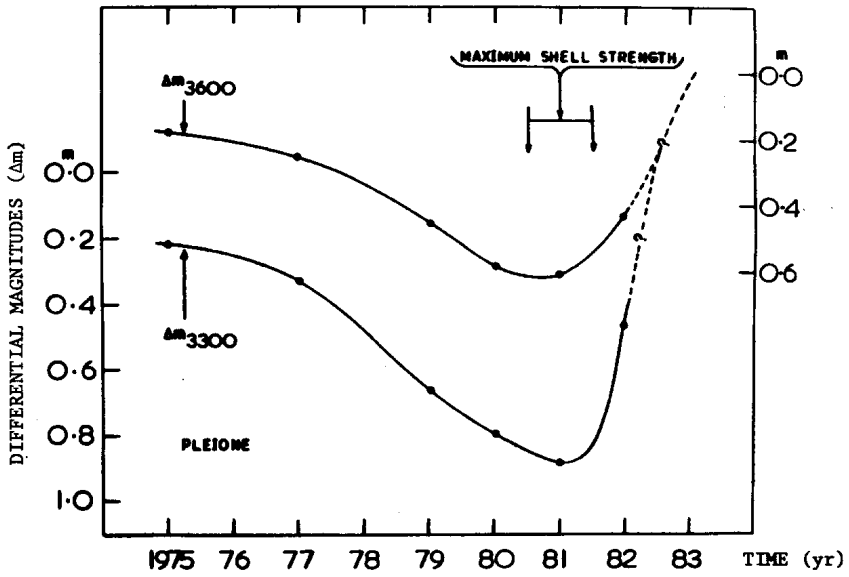

Figure 2: Variation of differential magnitudes of Pleione

It can be infered from this figure also that Pleione gained regular increase in shell strength since 1975 with maximum intensity during 1981, after which the strength started decreasing faster.

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