

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2493

Konkoly Observatory
Budapest
19 March 1984
HU ISSN 0374 - 0676

SHELL EPISODE OF PLEIONE (BU Tau)

Pleione is a well known shell star in the Pleiades cluster (HD 23862, $m_v = 5.20$, Sp.Type B8Vn + shell according to Abt and Levato (1978)). Its photometric variability was investigated by Sharov and Lyuty (1976) who collected all available photometric observations on the star. They observed a minimum in 1973 connected with a new shell outburst. In 1974 and 1975 Sharov and Lyuty observed the beginning of a slow increase in B and V. Hopp and Witzigmann (1980) observed BU Tau in B and V during 1977-1980. Their observations showed that the shell outburst still goes on as the star has not returned to its normal maximum light.

In continuation with previous observations, Hopp et al. (1982) again observed BU Tau during 1980-1982 in BV and UBV and found that BU Tau had an unusual great Balmer jump compared to stars of the same spectral type and luminosity class. They concluded that using 18 Tau as standard, BU Tau had a deficit of about 0.27 mag in U on 7 Sept. 1980. Van Leeuwen et al. (1982) performed measurements of Pleione in the Walraven VBLUW system during 1977-1981. Golay and Mauron (1982) presented data for Pleione in the Geneva system, obtained during 1962 and 1979. They found a continuous increase in ultraviolet blocking by hydrogen shell during 1977-1981.

In order to investigate the behaviour of BU Tau in Balmer continuum we made spectrophotometric observations of Pleione during December 1980. The observations were obtained in the wavelength range $\lambda\lambda 3200-7000 \text{ \AA}$ with a Hilger and Watts monochromator in the Nasmyth focus of the 52-cm telescope at Uttar Pradesh State Observatory. The scans were obtained with an exit slit of 0.7 mm admitting 50 \AA of the spectrum. BU Tau was observed on two nights (27 and 30 December 1980). Along with BU Tau, the comparison star 18 Tau (B8V) and the standard star α Leo were also observed. The observations of BU Tau and 18 Tau were reduced to absolute magnitudes with the help of the standard star. The absolute values of magnitudes correspond to Tug et al.'s (1977) calibration of α Lyrae. The standard deviation of the observations is ± 0.03 magnitude. The mean values of absolute magnitudes of BU Tau and 18 Tau normalized to wavelength $\lambda 5500 \text{ \AA}$ are plotted in Figure 1. In Figure 1, the

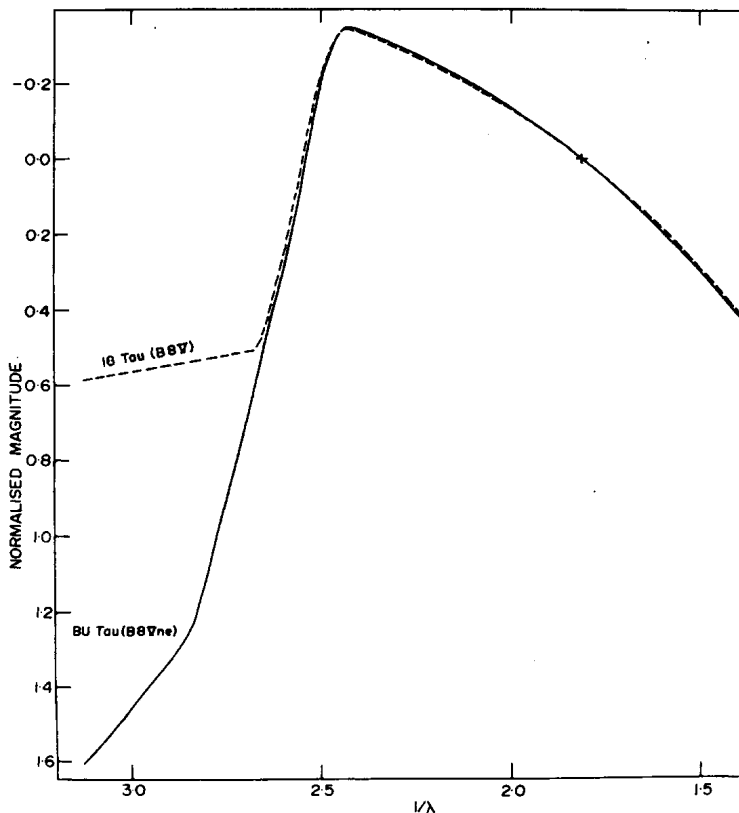


Figure 1

Relative spectrophotometry of BU Tau in comparison to 18 Tau. Spectral types and luminosity classes are indicated. The absolute magnitudes of both stars are normalized to $\lambda 5500 \text{ \AA}$ and the normalisation point is shown by a cross.

star BU Tau has been compared to 18 Tau, the latter star having the same spectral type and luminosity class as that of BU Tau. It is clear from Figure 1 that BU Tau has anomalously large Balmer jump relatively to a normal B star of the same spectral type and luminosity class. The Paschen continuum of BU Tau matches with that of 18 Tau.

In Figure 2, we have compared our present spectrophotometric observations of BU Tau with observations obtained by Van Leeuwen et al. (1982) in the Walraven VBLUW system. The dashed curve represents the differences in magnitudes between Pleione and 18 Tau (B8V) obtained spectrophotometrically by us during December 1980 and the solid curves represent the differences in magnitudes

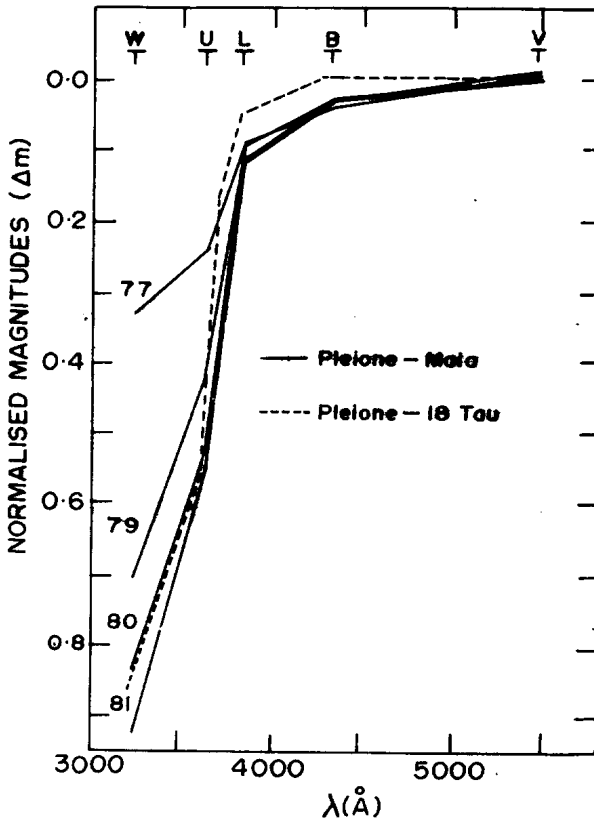


Figure 2

Comparison between the present spectrophotometric observations (dashed curve) and observations in Walraven VBLUW system (solid curves) made by Van Leeuwen et al. (1982). All curves are normalized to $\lambda 5500 \text{ \AA}$.

between Pleione and Maia (B8IV) obtained with Walraven VBLUW system by Van Leeuwen et al. (1982) during 1977-1981.

It is clear from Figure 2 that our spectrophotometric observations of Pleione match with those obtained in the Walraven system in the wavelength range $\lambda\lambda 3200\text{--}3700 \text{ \AA}$ during the same observational period in 1980. Our spectrophotometric observations, however, show excess flux in the wavelength range $\lambda\lambda 3800\text{--}5000 \text{ \AA}$. It is obvious from Figure 2 that the ultraviolet blocking by the hydrogen shell clearly increased during 1980-1981 but the increase goes less rapidly than in the years 1977-1979. The blocking is prominent in the Balmer continuum and does not influence the Paschen continuum.

From the above mentioned observations, we conclude that the Pleione shell episode which started in 1973, still goes on.

Acknowledgement: Our thanks are due to Dr. B.S. Rautela for going through the manuscript.

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