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PHOTOMETRY OF THE SHELL STAR BU Tau (PLEIONE) 1980 - 1982

This note continues our report on the photometric behaviour of the shell star BU Tau (Hopp, Witzigmann, 1980). BV measurements were collected during 12 nights with the 75 cm telescope of the Wilhelm Foerster Sternwarte, Berlin in the same manner as described in our previous note. In addition, one of us (UH) made UBV photometry with the 36 Cassegrain telescope of the Observatorium Hoher List during 7 nights. This telescope is equipped with an uncooled 1P21 photomultiplier, a conventional DC amplifier, standard UBV filters, two small band interference filters centered on 403 nm and 419 nm, respectively, and one broad band filter combination centered on 470 nm (G of the RGU system). As comparison stars served some bright Pleiades stars, especially 21, 22, and 27 Tau were always used. Magnitudes and colours of the stars are taken from Johnson and Mitchell (1958).
Our new values are given in the table, n is the number of individual measurements per colour of BU Tau. The B lightcurve of Sharov and Lyuty (1976), updated by our own measurements and by new observations of these authors (1981) is shown in Figure 1.

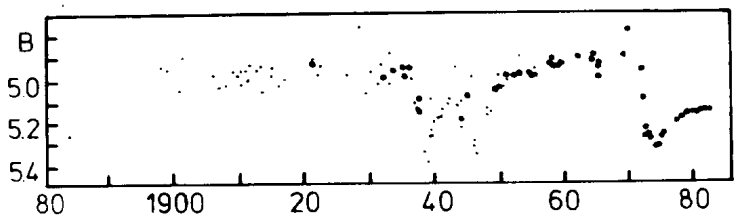

Fig. 1: The B lightcurve of BU Tau from 1980 to 1982. Small dots are photographic, large dots are photoelectric observations.

Table: UBV values of BU Tau 1980 - 1982

Jul. Date	V	B-V	U-B	n
244 4490^d	$5^m.21$	$-0^m.03$	$-0^m.14$	2
4489	5.21	-0.05	-0.16	3
4544	5.19	-0.02		2
4570	5.22	-0.05		3
4590	5.20	-0.07		2
4602	5.26:	-0.12:	-0.12	1
4644	5.20	-0.04		2
4647	5.20	-0.04		2
4662	5.21	-0.05		3
4852	5.19	-0.01	-0.14	2
4853	5.23	-0.04	-0.03	1
4872	5.16	-0.02	-0.14	2
4906	5.20	-0.01		3
4968	5.11	-0.05	-0.06:	5
5001	5.13	-0.04		5
5020	5.19	-0.04		1
5022	5.23	-0.03		3
5036	5.20	-0.03		4
5037	5.19	-0.04		4

Accuracy: V $\pm$ $0^m.01$, B-V $\pm$ $0^m.01$, U-B $\pm$ $0^m.02$

During September 1980 and 1981, we used also the additional three filters at the 36 cm telescope to make a multicolour photometry of BU Tau and some bright Pleiades members relative to the star 19 Tau. As example, we show in Figure 2 the measurements of Sept. 7, 1980. From these measurements, we conclude that BU Tau has an unusual great Balmer jump compared to stars of the same spectral type and luminosity class. If we use 16 or 18 Tau as standard, BU Tau has a deficit of about 0.27 in U. On Sept. 6, 1980, also a digital spectrogram was obtained with the grating spectrograph at the 106 cm Cassegrain telescope of the Observatorium Hoher List by means of a two dimensional SIT-vidicon detector system (EG & G-Instruments Optical Multichannel Analyzer OMA 2). For details of the OMA 2 system and the data reduction, see e.g. Geyer (1981).

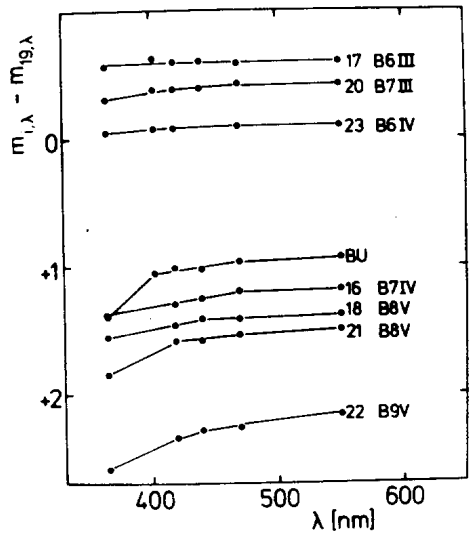

Fig. 2: Relative spectrophotometry of BU Tau and seven bright Pleiades members in comparison to 19 Tau. Star numbers, spectral types and luminosity classes are indicated. 19 Tau is of type B6V.

Figures 3a, b show the background but not flatfield corrected blue (λλ376 to 492 nm) and yellow-red (λλ550 to 660 nm) spectra of BU Tau with a total observing time of 14 sec in comparison to a 1.5 sec blue spectrum of α Lyrae taken with the same equipment under identical conditions but with nearly closed spectrograph slit. The spectral resolution of these spectra is roughly 0.3 nm.

Besides a number of absorption lines of HeI, NaI, CaII, FeII, SiII, TiII and CrII which can be identified, we see only H_α in emission (W_λ = 10.7 Å), H_β in absorption with imbedded, redshifted emission feature and H_γ - H_{10} in pure absorption. In Figure 4 enlarged portions of the H_3 to H_5 lines of BU Tau are shown.

From all the observations presented here, we conclude that the BU Tau shell episode which started in 1973 still goes on.

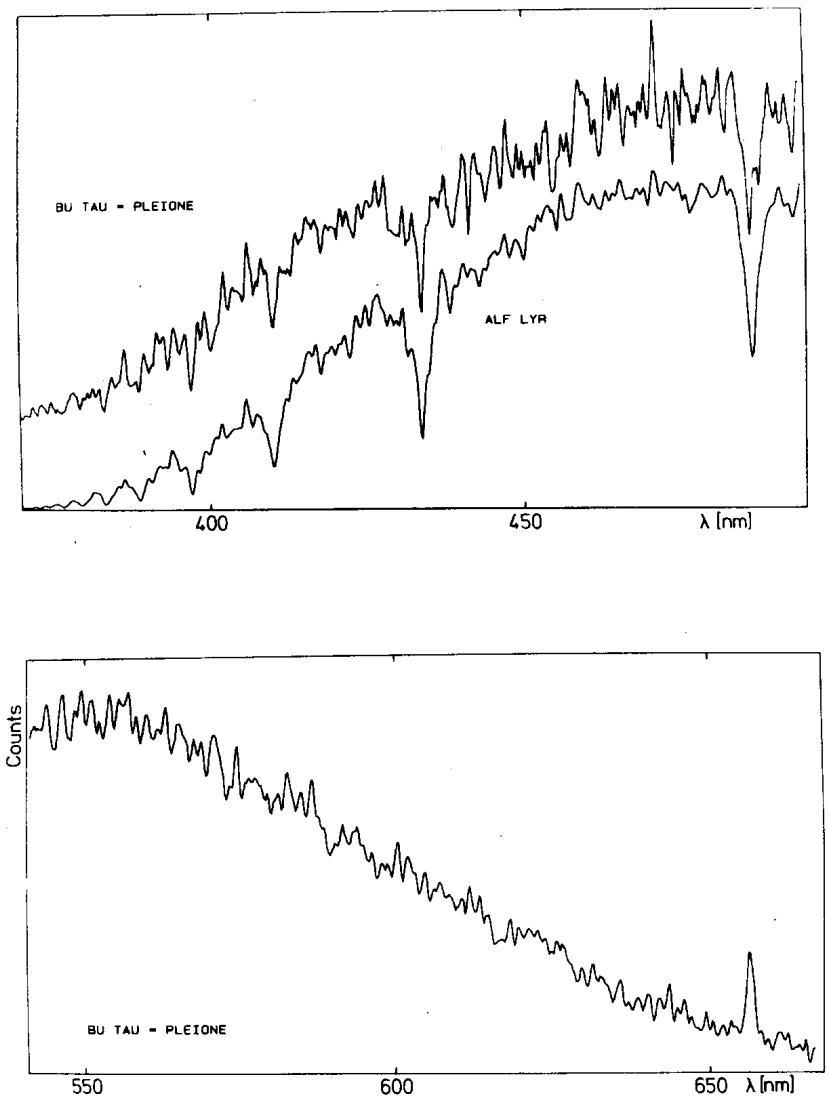

Fig. 3ab: Blue and yellow-red spectral features of BU Tau and α Lyrae.

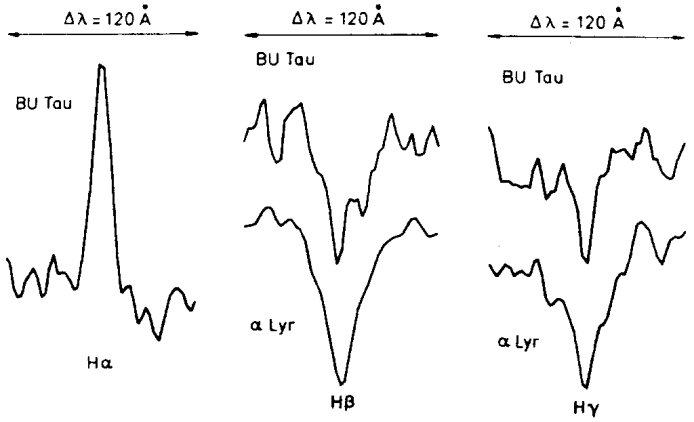

Fig. 4:Enlarged portions of the emission/absorption H_3 to H_5 - lines of BU Tau and α Lyrae.

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