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**DIFFERENTIAL UBV PHOTOMETRY OF TWO CP3 STARS:
11 Her AND 6 Her**

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The chemically peculiar star 11 Her (φ Her, HR 6023, HD 145389, HIP 79101, SAO 45911, B9p HgMn, $m_V = 4.3$) was selected from the paper of Catalano (1991) to investigate the photometric periods amongst Hg-Mn spectroscopic binaries. The object is an SB1 system with long orbital period of 560.5 days (Aikman 1976). Winzer (1974) found no evidence of significant photometric variations. Rakosch and Fiedler (1978) reported on period 7^d.832 in the *U* filter with the amplitude 0.015 mag but state that the star is constant in *B* and *V* filters above the semi-amplitudes 0.002 and 0.006 mag, respectively (based on *UBV* observations made in 1963-64 season). Since then, no undoubtful periodicity has been reported and especially as 7^d.832 concerns. Catalano and Renson (1998) for example give the Rakosch and Fiedler (1978) period 7^d.832 with question mark. Harmanec et al. (1994) mentioned that there might be some microvariability but not with the period after Rakosch and Fiedler (1978). Recently, very tiny light variations with the amplitude 0.007 mag from 4.219 to 4.226 mag were reported by ESA (1997) in the Hipparcos data. However, Adelman (1998) argues that the star is constant, the amplitude contains the contribution from noise for example.

The chemically peculiar star 6 Her (*v* Her, HR 5982, HD 144206, HIP 78592, SAO 45865, B9IIIp, HgMn, $m_V = 4.6$) was used as comparison star by Rakosch & Fiedler (1978) and no variability has been reported as yet, including the Hipparcos observations.

Stellar spectra of both stars were studied and perhaps reported firstly by Slettebak (1954).

The *UBV* observations have been carried out at Stará Lesná observatory with the photo-electric photometer attached to 0.6 m reflector. The comparison stars were: already mentioned 6 Her (standard) and SAO 48568 (check, HD 144248, A5, $m_V = 7.6$), and the observations were made in the sequence 3 times comp. — 3 times var. — 3 times check. Each observation of the star was followed by recording the sky background. The observations were corrected for differential extinction. The standard star was identical with that from Rakosch and Fiedler (1978). The observations were made in overall number of 19 nights covering the season January 1991 up to September 1993. Duration of a typical night run was 1.5 hour.

The weather conditions enabled us to obtain good observations needed for the search for periodicities of low amplitudes around 0.02–0.03 mag as much as 12 nights on average. Tables 1 and 2 list the instrumental magnitudes in each filter. The night averages are given with corresponding *rms* errors and column entitled ‘*n*’ stands for number of individual measurements in particular night.

Table 1: 11 Her – 6 Her, JD = 2 400 000 +

JD	ΔU	\pm	n	JD	ΔB	\pm	n	JD	ΔV	\pm	n
—	—	—	—	48274.686	-0.454	0.003	6	48274.686	-0.490	0.001	6
48276.703	-0.372	0.001	8	48276.703	-0.449	0.001	8	48276.702	-0.484	0.001	8
48331.610	-0.364	0.003	10	—	—	—	—	48331.610	-0.480	0.002	10
48350.583	-0.370	0.005	9	48350.581	-0.454	0.004	10	48350.581	-0.486	0.004	9
48369.575	-0.367	0.004	9	48369.575	-0.444	0.004	9	—	—	—	—
48436.409	-0.368	0.005	15	48436.409	-0.451	0.003	15	48436.408	-0.485	0.002	15
48646.678	-0.361	0.006	8	48646.678	-0.446	0.001	8	48646.678	-0.480	0.001	8
48691.589	-0.373	0.007	9	48691.589	-0.439	0.007	9	48691.589	-0.481	0.001	9
48692.547	-0.359	0.007	5	48692.547	-0.444	0.004	5	48692.547	-0.477	0.004	5
—	—	—	—	48841.431	-0.451	0.006	6	48841.429	-0.480	0.003	6
48993.702	-0.360	0.006	5	48993.703	-0.439	0.008	5	48993.701	-0.474	0.005	5
49030.668	-0.372	0.002	10	49030.617	-0.447	0.001	10	49030.617	-0.480	0.001	10
49253.347	-0.371	0.006	18	49253.347	-0.449	0.002	18	49253.346	-0.481	0.002	18

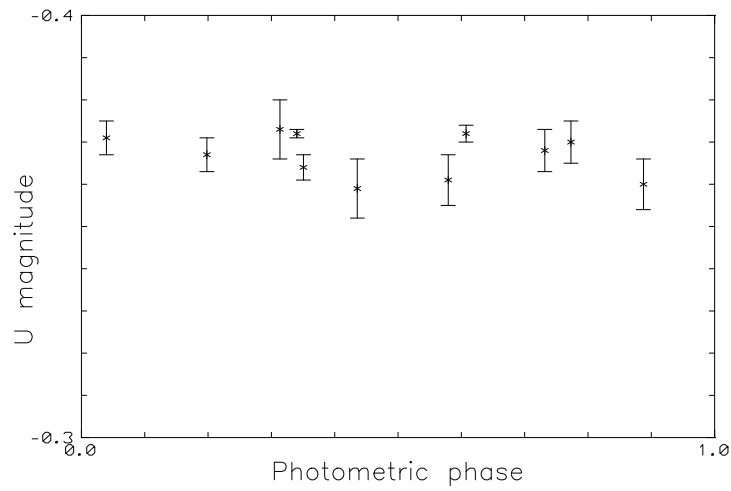
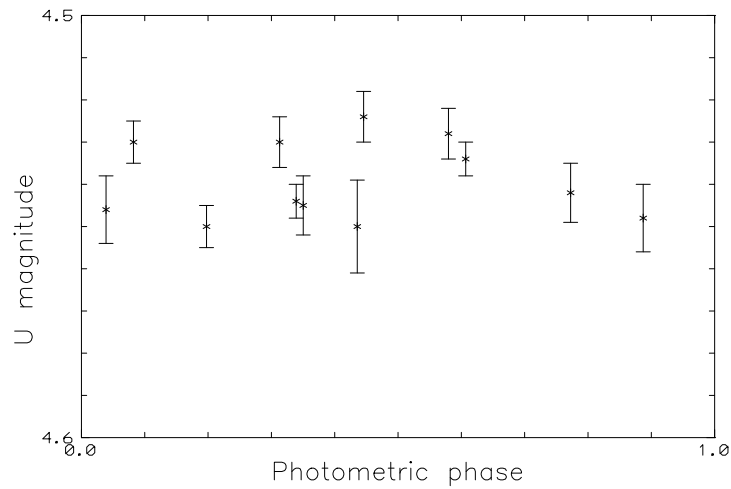
**Figure 1.** Phase diagram based on equation (1); U filter; 11 Her – 6 Her.**Figure 2.** Phase diagram based on equation (1); U filter; 11 Her – Check.

Table 2: 11 Her – Check, JD = 2 400 000 +

JD	ΔU	\pm	n	JD	ΔB	\pm	n	JD	ΔV	\pm	n
48274.682	4.530	0.005	6	48274.681	4.134	0.003	6	48274.680	3.841	0.003	6
48276.697	4.544	0.004	8	48276.697	4.131	0.002	8	48276.700	3.830	0.002	8
48331.605	4.545	0.007	10	48331.605	4.129	0.003	10	48331.605	3.832	0.003	10
48350.577	4.542	0.007	9	48350.577	4.128	0.004	9	48350.577	3.830	0.004	9
48369.570	4.550	0.005	9	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	48436.410	3.840	0.003	15
48646.682	4.528	0.006	8	48646.681	4.131	0.001	8	48646.681	3.835	0.002	8
48691.586	4.530	0.006	9	48691.586	4.131	0.001	8	48691.586	3.837	0.001	9
48692.545	4.550	0.011	5	48692.545	4.131	0.003	5	48692.544	3.836	0.004	5
48841.435	4.524	0.006	6	48841.435	4.118	0.003	6	48841.435	3.826	0.002	6
48993.699	4.548	0.008	5	48993.700	4.134	0.005	5	48993.698	3.846	0.004	5
49030.666	4.534	0.004	10	49030.614	4.133	0.001	10	49030.614	3.835	0.002	10
49253.344	4.546	0.008	18	49253.342	4.122	0.002	18	49253.343	3.842	0.004	18

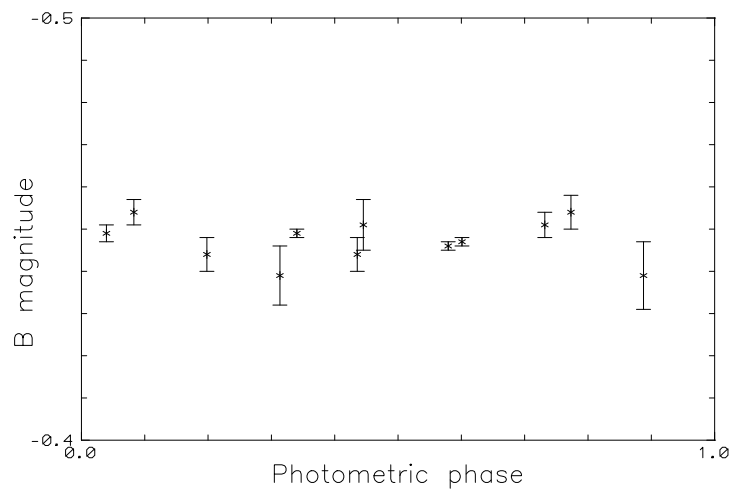


Figure 3. Phase diagram based on equation (1); *B* filter; 11 Her – 6 Her.

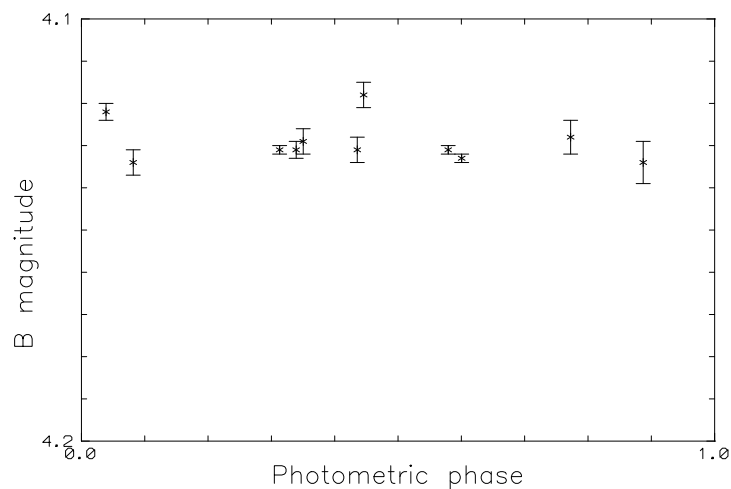


Figure 4. Phase diagram based on equation (1); *B* filter; 11 Her – Check.

We primarily focused the effort to verify the period of 7.832 days resulting from the ephemeris by Rakosch and Fiedler (1978):

$$\text{JD}(\Delta U_{\min}) = 2438523.2 + 7.832 \times E. \quad (1)$$

Figures 1, 2 give magnitude differences vs. phase in U and B filters respectively. We did not find any outstanding period and the star seems to be constant. The power spectra enabled us to put the following constraints on the constancy (the semi-amplitudes) of the variable star: 7, 5, 4 mmag in U , B and V filters respectively. Consequently, we cannot confirm the period 7^d.832 suggested by Rakosch and Fiedler (1978). Using 6 Her as standard star might not be a good practice but it was motivated by comparison stars option by Rakosch & Fiedler. As a byproduct we can state that the same constraints on the constancy are also valid for another CP3 star 6 Her, this time in agreement with the Hipparcos satellite observations.

Our UBV observations questioned the variability of 11 Her and suggest light constancy beyond 0.01 mag limit in the season 1991–1993. The same limit for light variability goes for comparison star and another CP3 star 6 Her. Similarly to Adelman (1993), Adelman et al. (1994) and Zboril and Budaj (1993) we added another star to a list of ‘constant’ HgMn stars (above 0.01 mag limit) which were originally reported as variable stars. However, we still welcome new observations since: *i*) we cannot exclude low amplitude variability below 0.01 mag such as that reported by ESA (1997), *ii*) the star was reported by Babcock (1958) as magnetic star and *iii*) the star might have changed the period or amplitude.

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