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TIME OF LIGHT MAXIMUM OF BW VULPECULAE[1]

We report photometric observations of the β Cephei star BW Vul (HD 199140 = HR 8007, B2III, V = 6.55) obtained on June 17 and 18, 1993 at Jungfraujoch Observatory. The measurements were obtained in the V_1 filter band of the Geneva photometric system. The comparison stars were the same as C_1 and C_2 used by Sterken et al. (1986), viz. HD 198820 = HR 7996 (B3III, V = 6.44) and HD 198527 = SAO 089185 (B9.5V, V = 7.0).

On June 17, the observations were carried out according to the scheme $C_1, BW\,Vul, C_2, C_1, BW\,Vul, C_2, C_1, BW\,Vul, \ldots$ and on June 18 the scheme $C_1, BW\,Vul, C_1, BW\,Vul, C_1, BW\,Vul, C_1, \ldots$ was adopted, with additional measurements of C_2 during the first and last hours of the night. Each datapoint consisted of a measurement of about 1 minute duration. Sky background was measured about once every two cycles.

The data were corrected for sky background contribution, and for the effect of atmospheric extinction; the extinction coefficient k_{V_1} (0.256 and 0.183, respectively on June 17 and 18) was derived by application of the classical Bouguer method on the measurements of C_1 and C_2. The mean magnitude difference between C_1 and C_2 (in the sense C_1 *minus* C_2) was $-0\overset{m}{.}754 \pm 0\overset{m}{.}003$ for the first night, and $-0\overset{m}{.}761 \pm 0\overset{m}{.}001$ for the second. We assess the quality of our data as of weight 4 (on the scale given by Sterken et al. 1993) for June 17 and of weight 5 for June 18. Table 1 gives the differential V_1 magnitudes BW Vul *minus* C_1.

Sterken et al. (1987) argued that there are two reasons for using time of minimum instead of time of maximum for determining the variation of the pulsation period of BW Vul. First, due to the occurrence of the stillstand phenomenon (until about 30 minutes before the time of maximum light), the time base of data suitable for determining the time of maximum is more than two times smaller than it is at minimum light. Second, the disturbance of the stillstand on the shape of the light curve progressively increases towards infrared wavelengths (see Fig. 3 of Sterken et al. 1987), a circumstance that may seriously affect the result when data obtained with different filter systems are combined. However, due to the coincidence of the phase of minimum light and the end of astronomical twilight, and due to the very short duration of the night at this time of the year, no minimum of the light curve could be observed, but we did cover one phase of maximum on June 18, which yielded a time of maximum light $T_{max} = HJD2449157.4855$.

The linear ephemeris given by Sterken et al. (1993) is not directly applicable, so we calculated the $O-C$ values on the basis of the period $P = 0\overset{d}{.}2010443$ derived by these authors, and on the times of maximum given in Table 6 of their paper. That $O-C$

[1]BASED ON OBSERVATIONS COLLECTED AT THE HOCHALPINE FORSCHUNGSSTATION JUNGFRAUJOCH (SWITZERLAND)

diagram ($T_0 = 2428801^d9530 \pm 0^d0007$) is given in Fig. 1, the position corresponding to our new time of maximum is indicated by a solid circle.

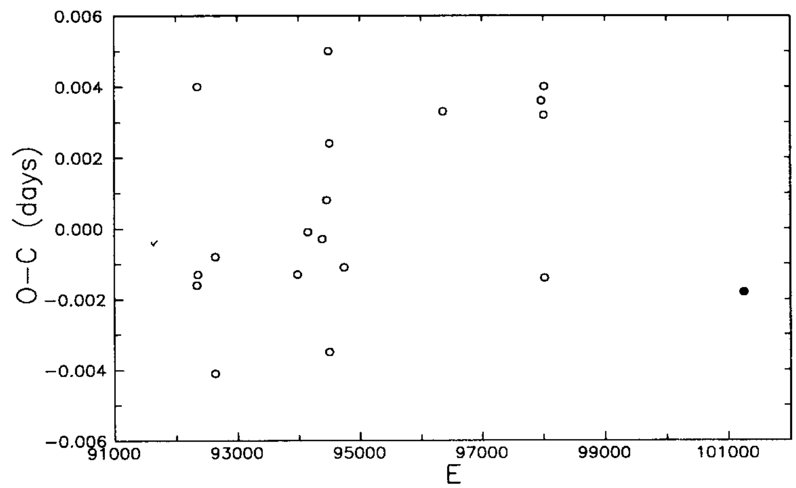

Figure 1: $O - C$ diagram for all available times of maximum since June 15, 1988 (the solid circle represents the new time of maximum reported in this paper) according to the cycle-count scheme given by Sterken (1993) and with $P = 0^d2010443$.

Table 1. Differential V_1 magnitudes of BW Vul *minus* HD 198820. HJD is heliocentric julian date *minus* 2,440,000.

HJD	ΔV_1	HJD	ΔV_1	HJD	ΔV_1	HJD	ΔV_1
9156.4806	0.017	9157.3936	0.224	9157.4655	0.075	9157.5124	0.106
9156.4901	0.047	9157.3992	0.212	9157.4707	0.056	9157.5155	0.112
9156.4965	0.072	9157.4047	0.191	9157.4745	0.046	9157.5239	0.141
9156.5028	0.089	9157.4102	0.186	9157.4778	0.040	9157.5324	0.163
9156.5083	0.114	9157.4158	0.166	9157.4808	0.028	9157.5370	0.175
9156.5140	0.123	9157.4216	0.145	9157.4845	0.024	9157.5427	0.194
9156.5393	0.190	9157.4272	0.125	9157.4874	0.027	9157.5472	0.210
9156.5455	0.208	9157.4322	0.112	9157.4906	0.029	9157.5507	0.219
9156.5511	0.217	9157.4377	0.101	9157.4940	0.045	9157.5571	0.234
9156.5583	0.236	9157.4445	0.091	9157.4976	0.050	9157.5612	0.241
9156.5636	0.240	9157.4511	0.093	9157.5003	0.064	9157.5652	0.239
9156.5686	0.235	9157.4545	0.086	9157.5033	0.079		
9156.5768	0.236	9157.4586	0.087	9157.5063	0.082		
9157.3861	0.235	9157.4619	0.085	9157.5097	0.098		

The "annual" mean $O - C$ values for the times of maximum yield an estimated mean error on one T_{max} of 0^d0027, whereas the estimated mean error on one T_{min} amounts to about 0^d0017. Our result indicates that no strong change in the period of BW Vul has occurred since September 1992. Evidently, more photometric data are needed to monitor the forthcoming changes of the period of BW Vul. For a detailed discussion on the interpretation of the period changes in BW Vul, we refer to Sterken (1993).

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