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PHOTOELECTRIC MINIMA OBSERVATIONS OF THE SHORT PERIOD ECLIPSING BINARY BP VELORUM

The variability of the thirteenth - magnitude star BP Velorum (α=08h 16m 29s, δ=-45°14'.1 , 1950.0) was announced by de Kort (1941). He obtained a photographic light curve and classified this system as a W UMa - type eclipsing binary. From his observations 29 times of minimum were determined which yielded the following ephemeris:

$$\text{Min I} = \text{Hel. J.D. } 2426710.6711 + 0^{d}.26498500\ E$$
$$\pm\ 0.0015 \quad \pm 0.00000054 \qquad (1)$$

During an observational run at the Complejo Astronomico El Leoncito -CASLEO- (San Juan, Argentina) in March 1988, BP Velorum was observed photoelectrically using the 215 cm telescope. Observations were carried out with the Vatican Observatory polarimeter VATPOL (Magalhaes et al., 1984) used as a photometer. Two dry-ice cooled RCA 31034 Ga-As photomultipliers were employed as detectors. A standard BV set of filters and diaphragms of 5 and 8 seconds of arc were also employed.

The measurements were made differentially with respect to the comparison star which is the first faint one directly north of the variable in de Kort's finding chart. All the observations were corrected for first and second order differential extinction. As the comparison is located very near BP Velorum, the corrections were small.

A total of 930 observations (465 in each band) covering the whole light curve have been obtained. From these observations twelve times of minimum were calculated. The bisection-of-chords procedure was used to determine six times of the primary minimum and six of the secondary one. A linear least square solution using our photoelectric data yielded this updated ephemeris:

$$\text{Min I} = \text{J.D. hel } 2447232.58031 + 0^{d}.265092\ E$$
$$\pm\ 0.00015 \quad \pm 0.000026 \qquad (2)$$

The photoelectric minima, reported in this note, together with the epoch numbers and O-C residuals, calculated from ephemeris given in equation (2), are listed in Table I.

Table I. Photoelectric times of minimum light of BP Velorum

Min	JDhel. 2440000.+	E	O-C
II	7230.5920	-7.5	-0.00013
II	7230.5915	-7.5	-0.00064
I	7232.5814	0.0	0.00112
I	7232.5809	0.0	0.00056
II	7232.7129	0.5	0.00009
II	7232.7124	0.5	-0.00042
I	7233.6408	4.0	0.00014
I	7233.6408	4.0	0.00017
II	7234.5689	7.5	0.00036
II	7234.5678	7.5	-0.00074
I	7234.7006	8.0	-0.00044
I	7234.7010	8.0	-0.00007

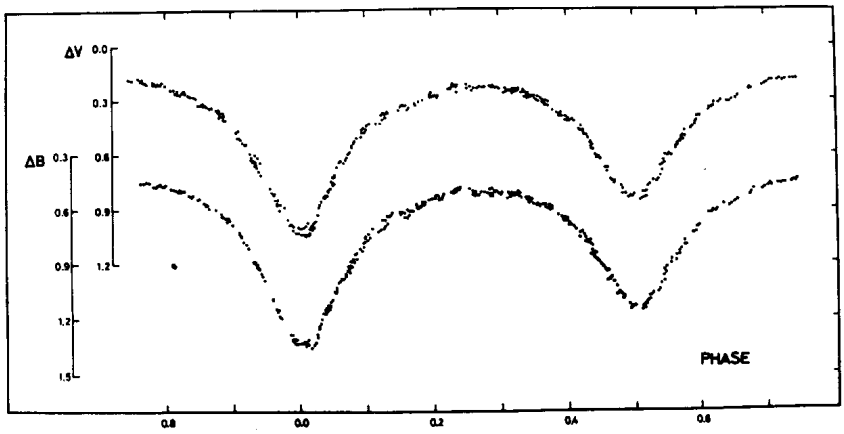

Figure 1

BV light curves of the eclipsing binary BP Velorum

As shown in this table, the differences between the observed minima and those calculated from ephemeris (2), yield very small randomly distributed O-C residuals, all being smaller than 0.001 day. Because of the shortness of the period and the large amount of time elapsed without observations, it is difficult to join unambiguously our minima with the older photographic ones. Consequently, although from equations (1) and (2) it would seem to exist a slight tendency to a longer period, no variability of the period can be asserted.

The differential light curves in B and V bands are shown in Figure 1. There is no doubt that we are dealing with a close (contact) system. The depth of primary and secondary minima is about 0.8 and 0.6 magnitudes, respectively. Besides, the light curves at maxima clearly show the variations due to the tidal deformation and the reflection effect of the components.

The observations of this system will be continued in order to complete the poor coverage of the maximum following the secondary minimum.

A detailed photometric analysis of this star by means of a synthetic method of solutions will be published later.

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