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PHOTOELECTRIC LIGHT CURVES AND EPHEMERIS OF FM VELORUM

The variability of the twelfth magnitude short period eclipsing binary FM Velorum ($\alpha_{1985} = 9^{\text{h}}47^{\text{m}}11^{\text{s}}$, $\delta_{1985} = -53^{\circ}24'06''$) was first announced by Van Houten (1951). He classified this variable as a W UMa type system and obtained, on the basis of his photographic measurements, the following ephemeris:

$$\text{Min.I.} = \text{J.D. hel. } 2429043.238 + 0^{\text{d}}.3895262 \cdot E$$

So far, no other data have been published on this star. During an observing run at Las Campanas Observatory (LCO), Chile, FM Velorum was observed photoelectrically in the UBV system using the 60-cm telescope of the David Dunlap Observatory. An RCA 1P21 photomultiplier refrigerated by dry ice, photon-counting electronics and standard UBV filters were used. The measurements were made differentially with respect to the comparison star which is designated with number 2 in our finding chart (Figure 1).

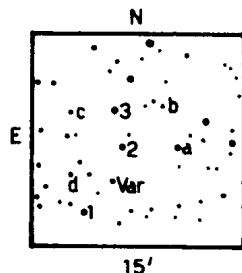


Figure 1. Finding chart of FM Velorum

All the observations have been corrected for first and second-order differential extinction. Standard stars were also observed at LCO during four different nights so the data could be converted into the standard UBV system. No variation in the light of the comparison star was detected. This star was found to have the following mean values:

$$V = 11.^m314, \quad B-V = 0.^m521, \quad U-B = 0.^m255$$

FM Velorum was found to have the following magnitude and colours at maximum light:

$$V = 12.^m431, \quad B-V = 0.^m561, \quad U-B = 0.^m025$$

The location of the variable in the colour-colour diagram (Schmidt-Kaler, 1965) is consistent with an unreddened main sequence star with an F8 spectral type.

A total of 1683 individual observations (561 in each band) has been obtained. The bisection-of-chords procedure was used to determine 9 times of primary minimum and 6 of the secondary one. A linear least squares solution using our photoelectric data yields the following updated ephemeris:

$$\begin{aligned} \text{Min.I.} = \text{J.D. hel. } & 2446117.7481 + 0.^d389580 \cdot E & (1) \\ & \pm 0.0001 \pm 0.000021 \end{aligned}$$

Table I lists the 15 times of minimum light reported in this note. The last two columns give the epoch numbers and the (O-C) residuals calculated from equation (1). 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, no variability of the period can be asserted.

Orbital phases for all the observations have been calculated from the ephemeris given in equation (1) and hence, light and colour curves have been obtained. The differential light curves in the V-magnitude and (B-V) colour

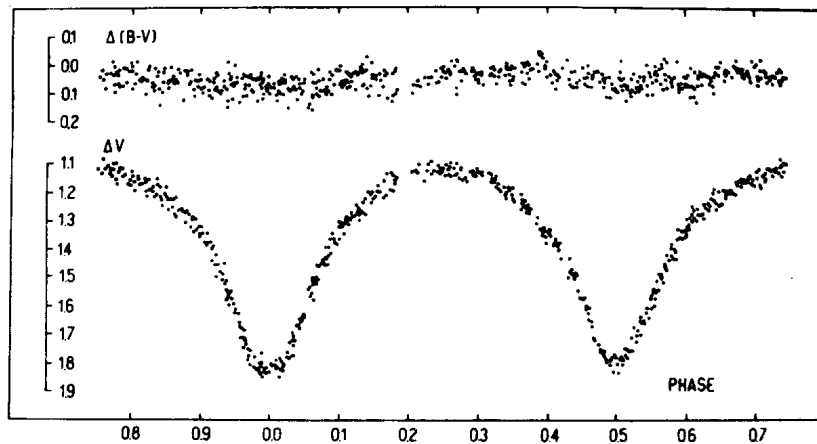


Figure 2. V and B-V light curves of the eclipsing binary FM Velorum

Table I. Times of minimum light of FM Velorum

Min.	Colour	J.D. Hel. 2440000.0 +	E	(O-C)
II	V	6116.7736	-2.5	-0.0005
II	B	6116.7734	-2.5	-0.0007
II	U	6116.7745	-2.5	0.0004
I	V	6117.7490	0.0	0.0009
I	B	6117.7485	0.0	0.0004
I	U	6117.7485	0.0	0.0004
II	V	6118.7220	2.5	-0.0001
II	B	6118.7220	2.5	-0.0001
II	U	6118.7219	2.5	-0.0001
I	V	6119.6957	5.0	-0.0003
I	B	6119.6956	5.0	-0.0004
I	U	6119.6959	5.0	-0.0001
I	V	6121.6436	10.0	-0.0003
I	B	6121.6441	10.0	0.0002
I	U	6121.6442	10.0	0.0003

are shown in Figure 2. The differences ΔV and $\Delta(B-V)$ are in the sense variable minus comparison star. Similar behaviours are shown by the remaining B, U and (U-B) curves. The colour indices remain nearly constant all over the orbital cycle, while the light curves show the typical configurations of W UMa type stars. Depths of primary and secondary minima are about 0.7 magnitudes. In particular, the primary minimum appears to be slightly flattened (total eclipse) in which the light remains constant for about 27 minutes. This would be indicating that we are dealing with a W-type of the contact binaries (Binnendijk, 1970).

A detailed analysis of FM Velorum by means of the Wilson and Devinney (1971) computer procedure will be developed and published elsewhere.

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