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RW Dor, LIGHT CURVE AND STUDY OF THE PERIOD

The variability of RW Dor (HV 2435, Bph \approx 10.8) was announced in Harv. Ann. 60, 100, 1908. Hertzsprung (B.A.N., II, 77, 1925) determined the first photographic elements and found a light curve of W UMa type; he quotes the spectral type K5 as given in Harv. Bull. 754, 1921, suggesting the star to have dwarf characteristics and a sensible proper motion. Schilt (B.A.N., III, 88, 1925) published an improved photographic light curve, he obtained a difference in depth of minima of 0.11 mag and estimated preliminary geometrical elements. Further, Hertzsprung (B.A.N., IV, 146, 1928) published photographic minima and a period $P = 0^d.14273194 \pm 0^d.00000006$. These elements are given in the GCVS (Kukarkin et al. 1969) and in the Finding List I.B.S. (Wood et al. Philadelphia, 1980). Jones (M.N.R.A.S., 85, 1924-5) measured the proper motion of RW Dor and Dworak (I.B.V.S., 846, 1973) computed the photometric parallax including the system among the eclipsing binaries within 100 ps from the sun. These data confirmed Hertzsprung's 1925 suggestion.

We included RW Dor in our programme of UBV photoelectric observations at the Bosque Alegre Station of Cordoba Observatory. From about 500 observations obtained in 1979-1980 we derived eight times of minimum light for each pass-band of the UBV system. The colour-average of these minima are listed in Table I (mean errors are in parenthesis) together with the photographic minima published by Hertzsprung (1928).

A linear least squares ephemeris for Hertzsprung values gives,

$$(1) \quad PM = JD \text{ Hel } 2418240.3154 + 0^d.28546389 \times E', \\ \pm 0.0015 \pm 0^d.00000010 \text{ m.e.}$$

while for our photoelectric data we obtain

$$(2) \quad PM = \text{JD Hel } 2444514.97510 + 0.^d.28546261 \times E'', \\ \pm 0.00020 \pm 0.^d.00000053 \text{ m.e.}$$

The above light elements show that the period has not changed within the errors since 1920's. Therefore all minima (Table I) have been included in the analysis for a linear ephemeris, giving

$$(3) \quad PM = \text{JD Hel } 2430938.60171 + 0.^d.285463812 \times E, \\ \pm 0.00078 \pm 0.^d.000000016 \text{ m.e.}$$

Table I
Minima of RW Dor

Min	Colour	J.D. Hel (2400000+)	E	(O-C)	(O-C)'	(O-C)''	Remarks
II	Pg	11298.835	-68799.5	0.0008	0.002		1
II	Pg	14168.883	-58745.5	-0.0044	-0.004		1
II	Pg	15621.901	-53655.5	0.0028	0.003		1
II	Pg	16013.836	-52282.5	-0.0040	-0.004		1
II	Pg	16489.714	-50615.5	0.0058	0.006		1
I	Pg	17075.903	-48562	-0.0051	-0.005		1
I	Pg	23784.600	-25061	0.0069	0.005		1
I	Pg	24172.537	-23702	-0.0014	-0.004		1
II	BV	44313.5813(10)	46853.5	0.0008		0.00007	2
II	BV	44464.8764(10)	47383.5	0.0002		-0.00002	2
I	UBV	44581.7728(8)	47793	-0.0009		-0.00055	2
I	UBV	44608.6063(5)	47887	-0.0010		-0.00059	2
II	UBV	44608.7488(6)	47887.5	-0.0012		-0.00073	2
II	UBV	44609.6063(8)	47890.5	-0.0001		0.00029	2
I	UBV	44609.7493(5)	47891	0.0002		0.00062	2
II	UBV	44610.7487(9)	47894.5	0.0005		0.00092	2

Remarks: 1/ Hertzsprung (1928), 2/ Present observations.

The cycles E and residuals (O-C) of these elements are listed in columns 4 and 5 of Table I, while (O-C)' and (O-C)'' from (1) and (2) are in columns 6 and 7. Note that the cycles E' and E'' are not given in Table I and that their zeros are different.

The differential light curves corresponding to the nights of January, 3, 4, 5 and 6, 1981, are displayed in Figure 1. They are relative to an uncatalogued star ($\Delta\alpha=28.^s.8 \text{ E}$, $\Delta\delta=6' 30'' \text{ N}$)

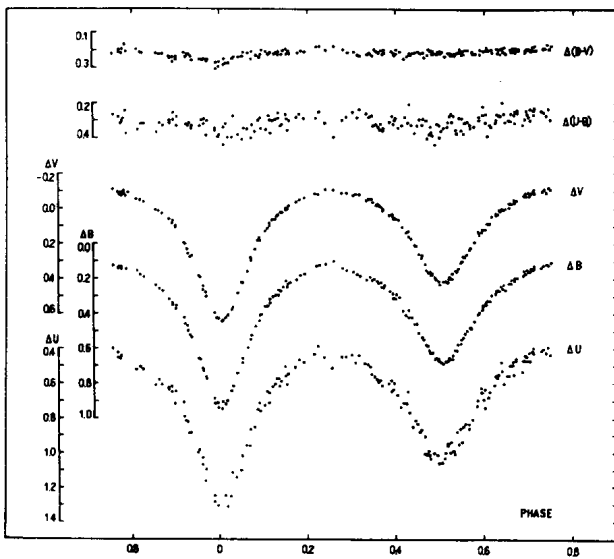


Figure 1.

of about the same colours. It is seen that the light curve of RW Dor is similar to a W UMa star as previously classified, however, primary minima are deeper than secondary minima by $\delta\Delta V \approx 0.22$, $\delta\Delta B \approx 0.23$, $\delta\Delta U \approx 0.22$, indicating a considerable difference of temperatures of the components, also the colours at primary minimum are redder than the combined light at maxima by about 0.1 mag.

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