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ORBIT OF RW CrB NOT ECCENTRIC

Since RW CrB was described (Fourth finding list of eclipsing binaries, Publications of the Univ. of Pennsylvania Astr. Series Vol.9. and Wood, F.B., Basic Astronomical data, page 379, Stars and Stellar Systems.) as an eclipsing binary with an eccentric orbit, photoelectric observations were made by one of us (E.F.M.) at the Kitt Peak National Observatory during 5 nights in June 1970.

The observations were made with single channel integrating photometers attached to the 50-inch and the no.3 16-inch telescope. For optimum efficiency, all observations were made in yellow light, where the shallow secondary minimum is deeper than in the blue. The star BD +29°2697 was used as the only comparison star. Table 1 gives the heliocentric Julian Date, the phase and the differences in magnitude between variable and comparison star. The magnitude system is that of the instruments, which is close to the V-system. A small systematic difference between the telescopes was removed by subtracting 0.01 from all the 16-inch telescope results.

The phases were computed from the formula

$$\text{phase} = 1.3766304 (\text{JD hel} - 2400000)$$

in which the reciprocal period corresponds to the period as given in the 1969 General Catalogue of Variable Stars. The lightcurves of the minima are shown in the Figure.

Table 2 gives the epochs of primary and secondary minimum and the corresponding phases.

The difference in phase between the minima is 0.4975 ± 0.0040 (s.e.), which is not significantly different from half a period.

This result could be explained assuming a sizeable eccentricity and a periastron length close to 90° ; however we prefer to believe that the orbit has some arbitrary periastron length with an eccentricity near zero.

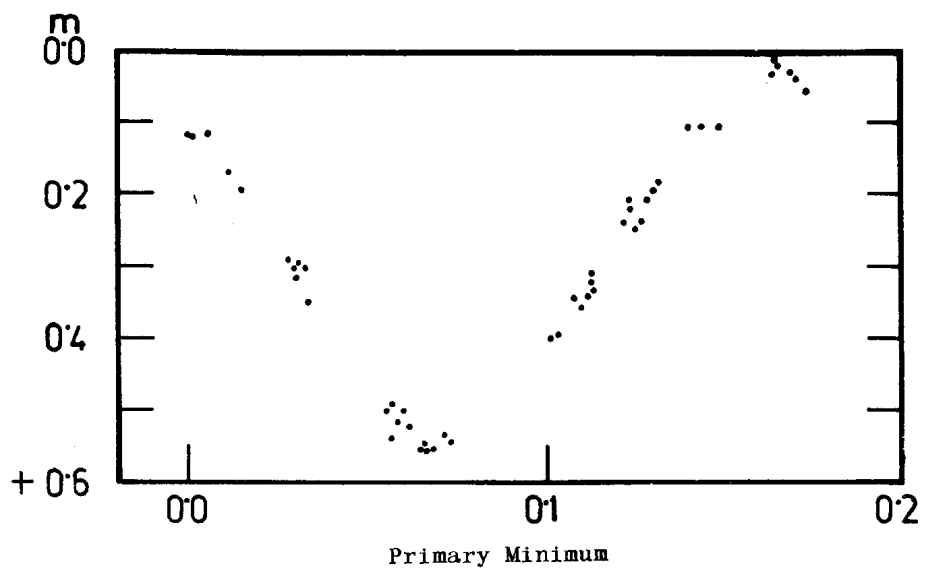


TABLE 1

J. D. hel.	Phase	m
2440000+	P	
748.778	.006	+0. ^m .12
.781	.011	+0.17
.783	.014	+0.19
.793	.028	+0.29
.795	.030	+0.30
.796	.032	+0.35
.847	.101	+0.40
.848	.103	+0.39
.875	.140	+0.11
.876	.142	+0.11
51.678	.000	+0. ^m .12
.680	.001	+0.12
.700	.029	+0.30
.701	.030	+0.32
.701	.031	+0.30
.719	.056	+0.50
.720	.057	+0.49
.722	.060	+0.50
.723	.061	+0.52
.759	.111	+0.34
.760	.112	+0.32
.761	.112	+0.33
.767	.121	+0.24
.768	.123	+0.21
.768	.123	+0.22
.772	.129	+0.21
.773	.130	+0.19
.774	.131	+0.18
.797	.163	+0.03
.798	.164	+0.02
.799	.165	+0.02
.802	.169	+0.03
.803	.170	+0.04
.804	.172	+0.06
752.774	.507	+0. ^m .01
.774	.508	+0.02
.775	.510	+0.02
.777	.512	+0.01
.778	.514	+0.02
.779	.515	+0.02
.782	.518	+0.02
.782	.519	+0.01
.783	.520	+0.02

TABLE 1 (Cont.)

J.D. hel.	Phase	m
2440000+	P	
752.786	.525	+0. ^m .03
.787	.526	+0.03
.788	.526	+0.03
.790	.529	+0.04
.791	.530	+0.04
.791	.531	+0.04
.793	.535	+0.04
.794	.536	+0.04
.795	.537	+0.04
.830	.585	+0.05
.831	.586	+0.06
.833	.589	+0.05
.834	.590	+0.05
.835	.593	+0.05
.836	.593	+0.06
.860	.626	+0.04
.860	.627	+0.03
.868	.637	+0.03
.869	.638	+0.01
.870	.639	+0.00
.872	.643	+0.01
.873	.644	+0.01
.876	.648	+0.01
.877	.649	+0.02
.879	.652	+0.01
.880	.653	+0.01
761.890	.057	+0. ^m .54
.892	.059	+0.52
.894	.062	+0.56
.895	.063	+0.56
.897	.066	+0.55
.898	.068	+0.56
.900	.071	+0.53
.901	.072	+0.54
.927	.108	+0.34
.928	.110	+0.36
.931	.113	+0.31
.939	.125	+0.25
.941	.127	+0.24
.957	.149	+0.11
63.687	.530	+0. ^m .06
.688	.531	+0.07
.718	.574	+0.06
.719	.575	+0.05
.721	.578	+0.05

TABLE 1 (Cont.)

J. D. hel.	Phase	m
2440000+		
63.722	.579	+0.05
.727	.586	+0.06
.735	.597	+0.07
.736	.598	+0.07
.738	.601	+0.07
.739	.602	+0.05
.739	.603	+0.05
.742	.606	+0.04
.743	.607	+0.04
.746	.612	+0.03
.747	.613	+0.03
.749	.615	+0.04
.749	.617	+0.04
.753	.623	+0.03
.757	.627	+0.03
.769	.643	+0.03
.770	.644	+0.02
.794	.679	-0.01
.796	.680	0.00

TABLE 2

Minimum	Julian Date	Phase
primary	2440748.7785	0.0725
secondary	2440749.1909	0.5750

EUGENE F. MILONE
 ADRIAAN J. WESSELINK
 University of Calgary, Alberta, Canada
 Yale University, New Haven, Conn, U.S.A.