COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1174

Konkoly Observatory
Budapest
1976 September 7

EVIDENCE FOR A PERIOD CHANGE IN THE ECLIPSING BINARY RY Gem*

Two epochs of minimum light of the eclipsing binary RY Gem were determined during winter of 1975-76 by means of a series of observations carried out with the 45 cm reflector of the Astronomical Observatory of Torino. We used a photoelectric photometer equipped with a photomultiplier EMI 6256 S and a V filter.

All the times of minimum light we could find in the literature are collected in Table 1. The epoch No.11 was evaluated by the authors using the time of end of totality, given by McKellar (1951) with an uncertainty of $0^d.007$, and the duration of totality ($5^h.26$) was estimated from our primary minimum. Assuming the linear ephemeris:

1) $\quad Min_I(Hel.) = 2427483.642 + 9^d.300706 \cdot E$

we derived the $(O-C)_1$ (see Table 1) of all the listed epochs of primary minimum. These residuals are plotted in Figure 1. It is seen at once that this representation is not satisfactory; it seems more advantageous to consider the epochs before and after about E=+600 separately. A linear ephemeris suggests itself for each group (from now on"labelled" A and B for E<+600 and E>+600, respectively). In the analysis normal minima were used; two of them,nos.4 and 5 (see Table 2), were given by Lause (1936) but the minima nos.2, 3,7,8 were calculated by the writers. The weights were assigned inversely proportional to the square of the estimated error. A least-square treatment for the two groups has led to the formulae:

A) $\quad Min_I(Hel.) = 2427827.7580 \pm .14 + 9^d.300876 \pm .6 \cdot E$

B) $\quad Min_I(Hel.) = 2442792.5190 \quad 9^d.300526 \pm .3 \cdot E$

*During the draft of this note, we read in Acta Astronomica (1976, 26,109) that a similar study had been made by D.S. Hall and T. Stuhlinger. The conclusions about a period change and the deduced periods are in excellent agreement with ours.

The period seems to have undergone a rather drastic change even if a large observational error in the epoch No.11 of Table 1 could conceal a rapid but continuous change in a short time interval.

Table 1

Individual observed minima of RY Gem

No.	J.D. Hel.	E	$(O-C)_1$	Observer
1	2418015.32	-1018	-0.20	Blazko
2	23800.484	- 396	-0.078	Beyer
3	24628.262	- 307	-0.063	Beyer
4	27483.642	0	0.000	Lause
5	27827.744	+ 37	-0.024	Lause
6	27874.265	+ 42	-0.007	Lause
7	27883.563	+ 43	-0.009	Lause
8	28106.772	+ 67	-0.017	Lause
9	28209.080	+ 78	-0.007	Lause
10	28246.300	+ 82	0.000	Lause
11	32245.67	+ 512	+0.07	McKellar
12	38681.700	+1204	-0.008	Kumsiashvili
13	38700.285	+1206	-0.008	Kumsiashvili
14	38737.485	+1210	-0.011	Kumsiashvili
15	38765.385	+1213	-0.013	Kumsiashvili
16	39416.385	+1283	-0.063	Kumsiashvili
17	39593.100	+1302	-0.061	Kumsiashvili
18	39769.900	+1321	+0.025	Kumsiashvili
19	39779.150	+1322	-0.025	Kumsiashvili
20	42792.521	+1646	-0.083	Present work
21	42820.419	+1649	-0.087	Present work

Table 2

Normal minima of RY Gem

No.		J.D. Hel.	W	E_A	$(O-C)_A$	Observer
1		2418015.32 ± 0.02	0.5	-1055	-0.014	Blazko
2		23800.484 ± 0.010	1	- 433	+0.005	Beyer
3	A	24628.262 ± 0.010	1	- 344	+0.005	Beyer
4		27827.7615 ± 0.0041	6	0	+0.004	Lause
5		28209.0912 ± 0.0034	8	+ 41	-0.003	Lause
6		32245.67 ± 0.01	1	+ 475	-0.004	McKellar
				E_B	$(O-C)_B$	
7		2438700.288 ± 0.008	2	- 440	0.000	Kumsiashvili
8	B	39593.131 ± 0.038	0.1	- 344	-0.007	Kumsiashvili
9		42792.519 ± 0.003	11	0	0.000	Present work

Table 2 summarizes the obtained results. The columns give: the normal minima with their estimated errors, the weights, the number of cycles E_A and E_B elapsed from the epochs nos.4 and 9, respectively, the $(O-C)_A$ and $(O-C)_B$ relative to the ephemeris A) and B), the observer.

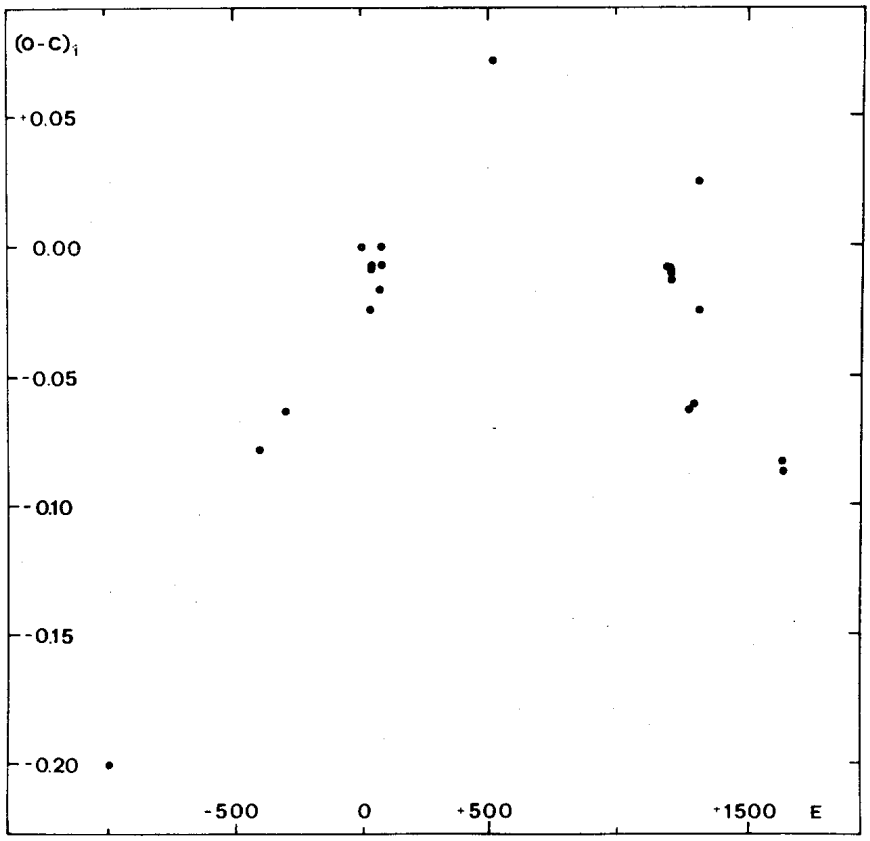

Figure 1 - (O-C)'s of the observed epochs of primary minimum of RY Gem according to the ephemeris 1) (see text).

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