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PERIOD VARIABILITY AND NEW EPHEMERIS OF RU LEPORIS

The eclipsing variable star RU Lep (CoD $-24^{\circ}3651$, CPD -24° 1206, discovery No. 637.1935) was pointed out by Hoffmeister (1935) as a variable star with Algol-type light curve. The first ephemeris based on visual estimates of brightness was published by Kaho (1938). The epoch of his ephemeris is further considered as zero epoch. Kaho gave the ranges of the eclipse D = 7.7, d = 2.4 h. Later he (Kaho 1950) published revised ephemeris based on photographic observations.

One of the authors (ZK) included RU Lep in the list of potentially interesting systems and on 7/8 Jan. 1978 the star was measred photoelectrically with the photometer P7 (Burnet, Rufener 1979) attached to the 40cm Swiss reflector at ESO La Silla, Chile. All measurements were made in the Geneva seven-colour photometric system. The eclipse was not sufficiently covered by observations as it occurred earlier than expected according to the ephemeris. In addition the descending branch of the minimum was influenced by a slight instability in atmospheric transparency and thus the accuracy of the time of minimum is lower than would be under normal conditions. Photometric quality of the night did not satisfy criteria for the normal photometry in the Geneva system but the observations were made differentially and thus the accuracy is reasonable. Standard stars were observed both at the beginning and at the end of the night. The star HD 41490 (CoD $-25^{\circ}2811$) served as comparison star. The measurements were done in the sequence CVCVC.....CVC, C for comparison, V for variable. Both comparison and variable stars were observed again on 15/16 Jan. 1978, a night of normal photometry when RU Lep was outside the minimum phase (0.81). In this way the measurements were tied-in to the Geneva standard photometric system. For details of reduction methods see Rufener (1964), for the properties of the Geneva photometric system see Golay (1980). The new ephemeris based on measurements in filter V of the Geneva system, which is in fact the same as V in the UBV system (Rufener, Maeder 1973), is given in Table I, together with Kaho's two ephemerides. The period of the new ephemeris is calculated from the epoch 3352 (this paper) and from Kaho's epoch 1064 thus representing the mean period between 1947 and 1978. If we use the epoch 0 and 3352 we obtain for the period the value 4.459608. Using this value for P the minimum at epoch 1064 should have occurred at 33313.086 or 24 minutes earlier.

Table I

E	T min		P		Ref.
0	28568.063	+	4.45907 E	1937	Kaho v
1064	33313.103	+	4.45963 E	1947	Kaho p
3352	43516.670	+	4.459601E	1978	Kviz pe

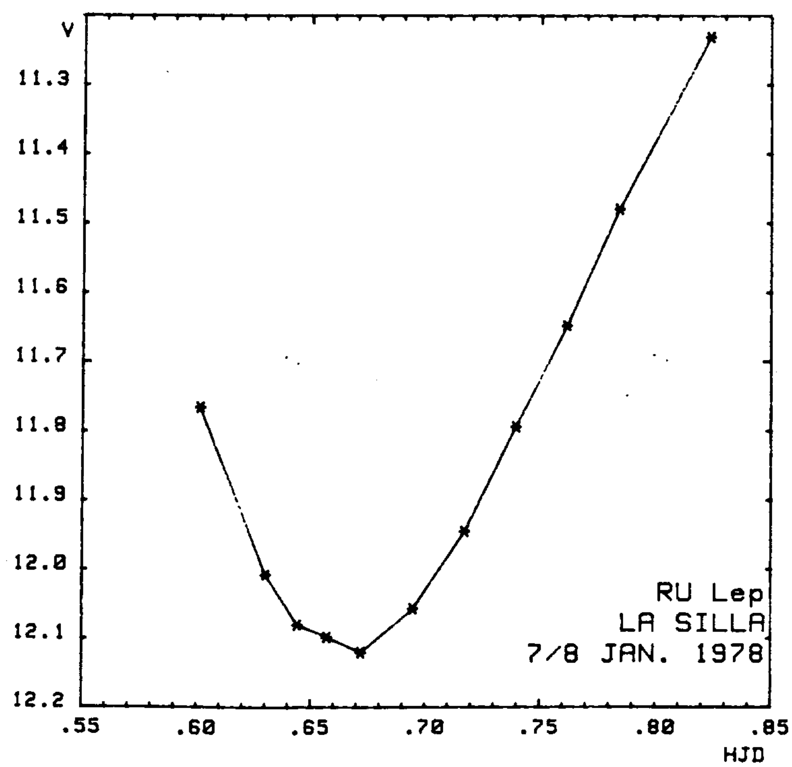

Figure 1

We may assume that the period was increasing after 1937 and is now decreasing. Even if we take the error of the time of minimum as 0.004 day the cyclic behaviour of the length of the period remains. Further photoelectric timing of the minimum and a careful search for secondary minimum is thus very desirable.

Individual V magnitudes vs. heliocentric Julian day are graphically represented in Fig. 1. This graph shows clearly the discrepancy with Kaho's conclusion about the flat bottom of the minimum. Kaho's original observations were not available to the authors and thus it is difficult to assess the reason for this discrepancy. It may be the low accuracy of the earlier visual and photographic estimates or the real change of the shape of the light curve.

The measured magnitudes with heliocentric Julian days are given in Table II. Table III gives the time of minimum for individual filters of the Geneva system calculated according to the Kwee and Van Woerden (1956) version of the Hertzsprung method. The mean errors are given in the last row under the respective digit.

Table II

	HJD	U	B1	B	B2	V	V1	G
1	43516.6014	12.457	12.041	11.145	12.618	11.766	12.505	12.840
2	43516.6302	12.753	12.429	11.431	12.915	12.009	12.809	13.130
3	43516.6442	12.775	12.467	11.495	12.963	12.081	12.805	13.311
4	43516.6571	12.934	12.511	11.591	12.983	12.099	12.896	13.181
5	43516.6720	12.941	12.508	11.576	13.003	12.121	12.838	13.181
6	43516.6948	12.906	12.471	11.522	12.910	12.057	12.787	13.158
7	43516.7172	12.736	12.252	11.335	12.734	11.945	12.647	13.026
8	43516.7394	12.501	12.037	11.131	12.578	11.793	12.522	12.876
9	43516.7615	12.400	11.847	10.957	12.408	11.647	12.355	12.742
10	43516.7841	12.245	11.639	10.746	12.211	11.479	12.204	12.587
11	43516.8234	12.006	11.329	10.449	11.948	11.231	11.943	12.382

Table III

U	B1	B	B2	V	V1	G
.674	.667	.669	.665	.670	.669	668
2	1	1	2	1	3	4

The change of colour indices and multicolour indices (d,Δ,g,X,Y,Z) during the eclipse is quite remarkable. According to the preliminary results and on the assumption that the eclipse is not far from the totality the components should be close to AV and FIII. As the minimum is not total, the interpretation of colour changes based on one minimum only is not possible and a full light curve is necessary for the solution of the system.

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