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CT Eri: PHOTOELECTRIC TIMES OF MINIMUM AND IMPROVED PERIOD

The variability of the tenth-magnitude star CT Eri (CD-33° 1755, CPD-33°506, FO) was first announced by Strohmeier (1968), who found a period of $0^d.634196$ from 24 photographic times of minimum obtained between 1903 and 1946. Bauernfeind (1968) reported 63 and 14 photographic times of minimum and maximum light, respectively. Strohmeier and Knigge (1969) classified the system as a W UMa-type eclipsing binary. However, the reality of the W UMa-type tentatively assigned by Strohmeier and Knigge was somewhat uncertain since the depth of the secondary minimum was unknown.

New photoelectric observations of CT Eri were carried out with the 150-cm reflector at the Bosque Alegre Station of the National University of Córdoba (Argentina) during six nights from November 1980 to January 1981. The f/21 Cassegrain reflector was equipped with a conventional design photometer. A 1P21 photomultiplier refrigerated with dry ice, standard UBV filters, and a circular diaphragm of about 1.8 mm in diameter (12 arcsec) were used. The measurements were made differentially with respect to the comparison star HD 28913, whose spectral type is B9. All the UBV observations have been corrected for first and second-order differential extinction. The comparison star is located $\sim 0^\circ.7$ south-east from CT Eri, and consequently the corrections applied for differential extinction were small. The mean errors of a single differential observation in V, (B-V), and (U-B) are about 0.015, 0.015, and 0.03, respectively. A total of 855 individual observations (285 in each band) has been obtained. The bisection-of-chords procedure was utilized to determine nine times of primary minimum and six of the secondary one.

Separate linear least squares solutions were obtained for the photographic data of 1900-23 (group I), 1924-35 (group II), 1936-43 (group III), and 1945-67 (group IV). A number of photographic minima considered not very reliable have not been used in the above calculation. Finally, a linear least squares solution using the mean photographic minima of each group and the new photoelectric ones yields the following improved ephemeris:

$$\text{Hel.Min I} = 2444555.6736 + 0^{d}.634195498\ E \qquad (1)$$
$$\pm 10 \qquad\qquad \pm 79$$

Table I

Individual times of minimum light of CT Eri

Minimum	J.D.Hel. 2400000 +	E	(O-C)	References
I	15267.879	-46181.0	-0.012	Bauernfeind
I	15337.694	-46071.0	0.041	"
I	16006.817	-45016.0	0.088*	Harvard Min.
I	16072.672	-44912.0	-0.013	Bauernfeind
II	16310.898	-44536.5	0.072*	"
I	16316.877	-44527.0	0.026	Harvard Min.
I	16377.788	-44431.0	0.055*	Bauernfeind
I	16558.538	-44146.0	0.059	"
I	16856.594	-43676.0	0.042	"
I	17166.670	-43187.0	-0.003	"
I	17497.763	-42665.0	0.040	"
I	17828.855	-42143.0	0.082*	"
II	18264.762	-41455.5	-0.020	"
I	18605.702	-40918.0	0.040	"
II	18651.669	-40845.5	0.028	"
I	18946.873	-40380.0	0.014	"
I	19326.741	-39781.0	-0.001	"
II	20177.537	-38439.5	0.021	"
I	20474.621	-37971.0	-0.015	"
I	20594.485	-37782.0	-0.014	"
I	20803.791	-37452.0	0.007	"
I	21160.834	-36889.0	-0.002	Harvard Min.
II	21330.499	-36621.5	0.016	Bauernfeind
I	23404.642	-33351.0	0.022	"
I	23820.601	-32695.0	-0.051	"
I	24120.643	-32222.0	0.017	"
I	24478.266	-31658.0	-0.047*	Strohmeier
I	24498.632	-31626.0	0.025	Harvard Min.
I	24503.668	-31618.0	0.025	"
II	24512.852	-31603.5	-0.024	Bauernfeind
I	24766.877	-31203.0	0.006	"
I	24804.877	-31143.0	-0.046	"
II	24821.733	-31116.5	0.004	"
I	25286.295	-30384.0	0.017	"
I	25500.611	-30046.0	-0.025	Harvard Min.

Minimum	J.D.Hel. 2400000 +	E	(O-C)	References
I	25561.489	-29950.0	-0.029	Harvard Min.
I	25617.362	-29862.0	0.034	"
I	25657.300	-29799.0	0.018	"
I	25995.346	-29266.0	0.038	"
I	26277.517	-28821.0	-0.008	"
II	26341.305	-28720.5	0.043	Bauernfeind
II	26576.559	-28349.5	0.011	"
II	26696.442	-28160.5	0.031	"
I	26763.270	-28055.0	-0.049	"
II	27722.509	-26542.5	-0.031	"
I	27754.552	-26492.0	-0.014	"
II	28072.624	-25990.5	0.008	"
II	28201.351	-25787.5	-0.006	"
I	28397.607	-25478.0	-0.033	"
I	28458.489	-25382.0	-0.029	"
I	28510.497	-25300.0	-0.031	"
I	28708.439	-24988.0	0.042*	Strohmeier
I	28760.331	-24906.0	-0.069*	"
I	28782.595	-24871.0	-0.002	"
I	28789.566	-24860.0	-0.007	"
I	28817.464	-24816.0	-0.014	"
II	28844.421	-24773.5	-0.010	"
I	28918.293	-24657.0	-0.022	"
II	29154.592	-24284.5	0.039	Bauernfeind
II	29203.420	-24207.5	0.034	"
II	29586.466	-23603.5	0.026	"
I	29651.409	-23501.0	-0.036	"
I	29679.311	-23457.0	-0.038	"
I	29848.639	-23190.0	-0.041	"
I	29911.403	-23091.0	-0.062*	"
I	30240.624	-22572.0	0.011	Harvard Min.
I	30254.595	-22550.0	0.029	Bauernfeind
I	30367.451	-22372.0	-0.001	Harvard Min.
I	30618.561	-21976.0	-0.032	Bauernfeind
I	30665.576	-21902.0	0.052*	"
I	31003.496	-21369.0	0.054*	"
II	31671.639	-20315.5	-0.036	"
I	32118.461	-19611.0	-0.005	"
I	32466.589	-19062.0	-0.050	"
I	33151.578	-17982.0	0.008	"
I	33494.644	-17441.0	-0.026	"
I	33703.275	-17112.0	-0.045	"
II	33718.263	-17088.5	0.039	"
II	34272.534	-16214.5	0.023	Strohmeier
I	34447.265	-15939.0	0.033	Bauernfeind
II	34692.407	-15552.5	0.059*	"
I	38314.549	-9841.0	-0.007	Strohmeier
I	38349.433	-9786.0	-0.003	"
I	38377.335	-9742.0	-0.006	"
I	38384.321	-9731.0	0.004	"
I	38398.280	-9709.0	0.010	"
I	39436.444	-8072.0	-0.004	"
II	44554.7251	-1.5	0.0028	This paper
II	44554.7257	-1.5	0.0034	"
II	44554.7270	-1.5	0.0047	"

Minimum	J.D.Hel. 2400000 +	E	(O-C)	References
I	44555.6716	0.0	-0.0019	This paper
I	44555.6719	0.0	-0.0017	"
I	44555.6736	0.0	0.0000	"
II	44556.6270	1.5	0.0021	"
II	44556.6291	1.5	0.0042	"
II	44556.6287	1.5	0.0038	"
I	44558.8440	5.0	-0.0005	"
I	44558.8423	5.0	-0.0022	"
I	44558.8444	5.0	-0.0002	"
I	44612.7488	90.0	-0.0023	"
I	44612.7499	90.0	-0.0013	"
I	44612.7495	90.0	-0.0017	"

*Minimum not used in computing ephemeris (1).

The second column of Table I lists the times of minimum light for CT Eri previously published together with the photoelectric minima reported in this note. The remaining columns give in succession the epoch numbers and residuals (O-C) calculated from the linear ephemeris given in equation (1), and sources of reference. In Figure 1 the (O-C) residuals are shown plotted against epoch number. They are randomly distributed showing that the orbital period has remained nearly constant from the first times of minimum in 1900 till the present time.

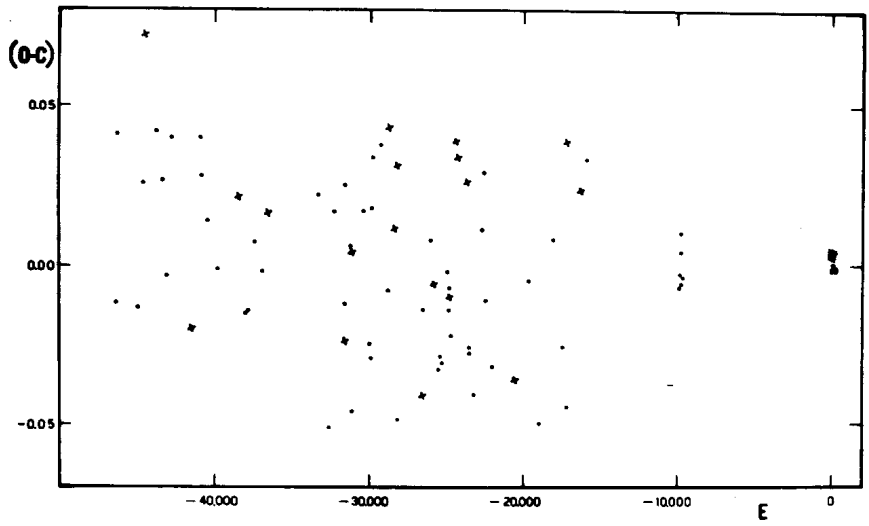

Figure 1

Orbital phases have been computed from the revised ephemeris (1) and preliminary light and colour curves have been obtained. The differential light curves in the V-magnitude and (B-V) colour are shown in Figure 2, the differences ΔV and Δ(B-V) are in the sense:variable minus comparison. Although the coverage of the light curves is not complete, the following interesting features should be noticed : (1) the light curves of CT Eri reveal a total eclipse at the secondary minimum where light is almost constant for about 90 minutes, (2) the depth of the secondary minimum is about one-half of the primary one. This feature argues, perhaps, in favour of a β Lyrae-type system rather than a W UMa-type. (3) there is no change in the colour index curve (B-V) throughout the orbital period.

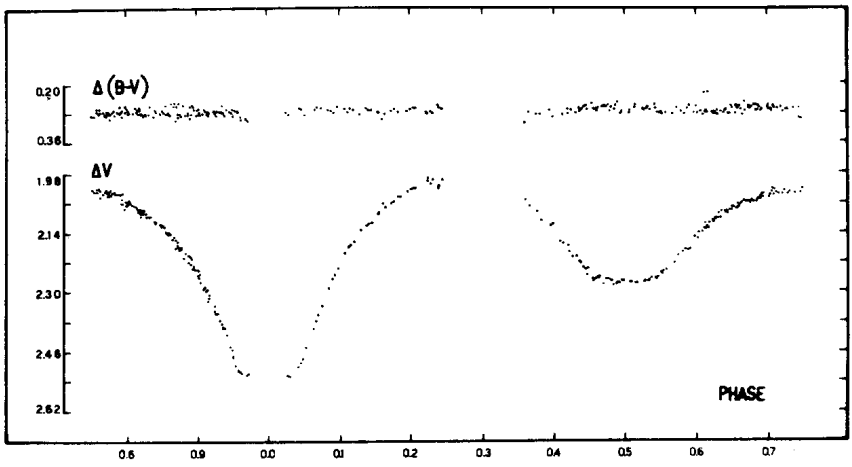

Figure 2

The system will be observed again in the next observing seasons in order to complete the light curves and analyze them using different methods of solution.

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