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NEW TIMES OF MINIMA, AND A RECENT PERIOD INCREASE, IN U CEPHEI

The very considerable data on period changes in U Cep was last summarized by Olson et al. (1981). Since then, Faulkner and Kaitchuck (1983) have determined three more times of minimum. We now give eight additional photoelectric times, determined with the 0.4-m and 1.0-m reflectors at Mount Laguna Observatory. The same uvby filter set was used for all observations, and I observations were also made with the 1.0-m telescope. Focal-plane apertures were either 20 or 25 arc-sec, and excluded both nearby visual companions (ADS 830 BC). Times of minima were determined using the Kwee, Van Woerden method, as programmed by R. C. Crawford.

TABLE I

NEW PHOTOELECTRIC TIMES OF MINIMUM LIGHT

JD (hel) -2440000.	E	O-C (days)	d (days)	Observer
4633.8455	2544	+0.0472	0.082	O
4658.7768	2554	0.0481	0.074	H
4840.7686	2627	0.0479	0.082	H
4850.7413	2631	0.0484	0.081	H
5179.8252	2763	0.0509	0.081	H
5558.7746	2915	0.0581	0.089	P
5720.8302	2980	0.0660	0.066[1]	Hu
6049.9151	3112	0.0695	0.090	O

[1] Disturbed eclipse.

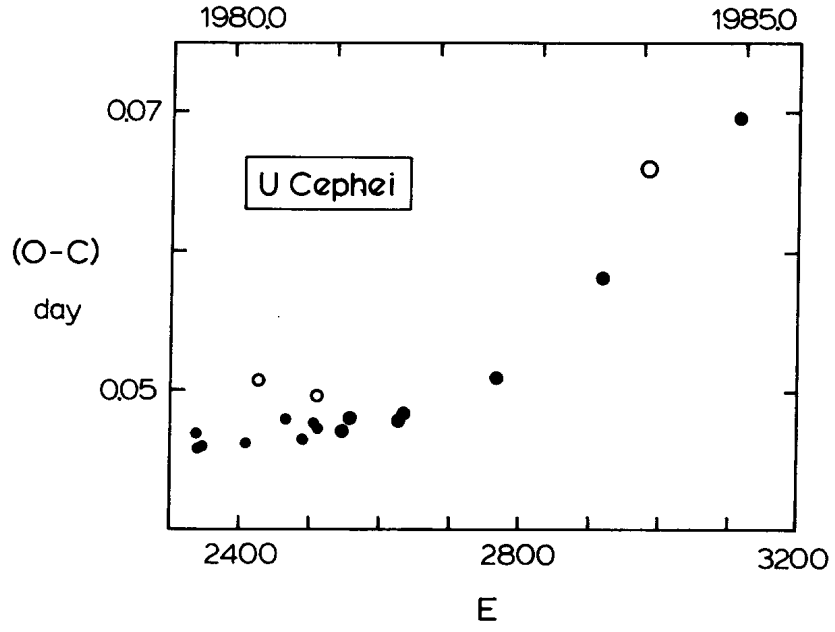

Figure 1 - Observed minus calculated times of minimum for U Cephei over the past six years. Large circles are new observations. Filled circles are from undisturbed eclipses, and open circles for disturbed eclipses (for which $d \lesssim 0.075$ day).

TABLE II

SUMMARY OF RECENT ABRUPT PERIOD CHANGES IN U CEPHEI

Cycle Count of Change	Year	$\Delta P/P$
1315	1972	-2.5×10^{-5}
1599	1974	$+1.0 \times 10^{-5}$
2284	1979	$- 0.8 \times 10^{-5}$
2750	1982	$+ 1.9 \times 10^{-5}$

As noted by Crawford and Olson (1979), we assume that only those eclipses with apparent totality, d, $\gtrsim$ 0.075 day were undisturbed by circumstellar light, and therefore gave true times of conjunction.

New times of minimum are listed in Table I, and all but one are undisturbed. We continue to calculate cycle count and (O–C) from the ephemeris JD(hel), I = 2438291.5020 + 2.493 0410E. Fig. 1 is a plot of residuals from this ephemeris, and includes previously published data back to the last period decrease. An 'abrupt' period increase occurred near E ~ 2750. Adding the four new observations before this increase to the eight undisturbed times since the last period decrease gives a refined ephemeris for the interval E = 2335–2631: JD(hel),I = 2438291.5324 ± 0.0005 + (2.4930478 ± 0.0000014) E. Combining our three undisturbed minima after the increase with those of Faulkner and Kaitchuck (1983) gives the post-period increase ephemeris: JD(hel),I = 2438291.4048 ± 0.0059 + (2.4930945 ± 0.0000015) E.

Recent period changes in U Cep are summarized in Table II. Both Fig. 1 and the corresponding figure in Olson et al. (1981) support the interpretation that abrupt period changes interrupt relative long intervals (a few years) during which the orbital period is sensibly constant. The abrupt period changes are of alternating sign. Though in the long run the period of U Cep has been increasing, there has obviously been a slight decrease over the interval covered in Table II. Disturbed eclipses continue to be spuriously late, as described by Crawford and Olson (1979). Finally, there continues to be no evidence whatsoever that these abrupt period changes have anything to do with sporadic episodes of mass transfer in U Cep.

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