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A NEW EPHEMERIS FOR ER CEPHEI

On June 20-22, 1995, two of the authors (RMB and RJH) used the Southeastern Association for Research in Astronomy (SARA) 0.9 m telescope at Kitt Peak National Observatory to test the newly acquired Axiom Research, Inc., AX-4 CCD camera equipped with a Kodak KAF 4200 (2048 \times 2048) chip. Observations of the galactic cluster NGC 188 were made using a Cousins R filter. The images were reduced using the MIRA Image Processing Software, developed by Axiom Research, Inc. Differential aperture photometry was performed, resulting in light curves for ER, ES, EQ Cep, and the variables V5 and V8 defined by Kaluzny & Shara (1987). Our ER Cep light curve is shown in Figure 1. Some intrinsic night-to-night variations appear to be present. A presentation and discussion of all the observations will be forthcoming. After phasing the ER Cep data using the zero-epoch HJD 2446696.8432 and period 0.2857299 days listed in Kaluzny (1990), we noticed that primary minimum occurred at phase 09.235. This indicated the need to determine a new ephemeris for ER Cep, which we present in this note.

Using the method of Kwee & van Woerden (1956), one primary and two secondary minima were determined from our observations. We also computed minima from the observations by Kaluzny & Shara (1987) and Kaluzny (1990). These are listed in Table 1, together with estimates for their mean errors. $(O - C)_1$ residuals are computed with respect to the Kaluzny (1990) ephemeris. The zero-epochs listed in Worden et al. (1978) and Kholopov & Sharov (1967) were also added to the list, as well as the minimum by Kholopov & Sharov (1966).



Figure 1. ER Cep differential $R_{\rm C}$ magnitudes observed on June 20 (squares), June 21 (triangles) and June 22 (diamonds), 1995



A weighted linear least squares fit to these minima yields the new ephemeris

$$Min. (HJD) = 2446696.84215 + 0.28573616 \times E$$
(1)
 $\pm 33 \pm 12$

The residuals, with respect to this ephemeris, are listed as $(O - C)_2$ in Table 1 and shown plotted in Figure 2. The orbital period of ER Cep appears to have remained secularly constant over the past 30 years. This is unusual given the short period of this moderately late spectral type $[(B - V)_0 \approx 0.74]$ W-type W UMa binary.

				1	
E	$(O-C)_1$	HJD	Error	$(O-C)_2$	Reference
-26106.0	-0.167	39237.411	0.001	-0.003	Kholopov & Sharov (1966)
-26106.0	-0.168	39237.410	0.001	-0.004	Kholopov & Sharov (1967)
-16525.0	-0.114	41975.043	0.001	-0.009	Worden et al. (1978)
-917.5	-0.00189	46434.68413	0.00066	0.00490	Kaluzny & Shara $(1987)^a$
-868.5	-0.00345	46448.68333	0.00081	0.00303	Kaluzny & Shara $(1987)^a$
-861.5	-0.0126	46450.6743	0.0012	-0.0062	Kaluzny & Shara $(1987)^a$
0.5	-0.00004	46696.98603	0.00007	0.00101	Kaluzny (1990)
276.0	-0.00019	46775.70446	0.00007	-0.00087	Kaluzny (1990)
276.5	0.00131	46775.84883	0.00058	0.00063	Kaluzny $(1990)^a$
286.5	0.00100	46778.70582	0.00019	0.00026	Kaluzny (1990)
287.0	0.00006	46778.84774	0.00031	-0.00069	Kaluzny $(1990)^a$
11171.0	0.06714	49888.79905	0.00028	-0.00172	this paper
11174.5	0.06819	49889.80016	0.00065	-0.00069	this paper
11178.5	0.0674	49890.9423	0.0012	-0.0015	this paper

Table 1. Minima for ER Cep

^a Determined in this paper from observations listed in the reference.

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References:

Kaluzny, J., 1990, AcA, 40, 61

Kaluzny, J., & Shara, M.M., 1987, ApJ, 314, 585

Kholopov, P.N., & Sharov, A.S., 1966, Astr. Circ., No. 377

Kholopov, P.N., & Sharov, A.S., 1967, Astr. Circ., No. 434

Kwee, K.K., & van Woerden, H., 1956, Bull. Astr. Inst. Netherlands, 12, 327

Worden, S.P., Coleman, G.D., Rucinski, S.M., & Whelan, J.A.J., 1978, MNRAS, 184, 33