## COMMISSIONS 27 AND 42 OF THE IAU INFORMATION BULLETIN ON VARIABLE STARS

Konkoly Observatory
Budapest
23 September 1996
HU ISSN 0374-0676

## 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 zeroepoch HJD 2446696.8432 and period 0.2857299 days listed in Kaluzny (1990), we noticed that primary minimum occurred at phase 0.235 . 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 $R_{\mathrm{C}}$ 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

$$
\begin{gather*}
\text { Min. }(H J D)=2446696.84215+0.28573616 \times E  \tag{1}\\
\pm 33
\end{gather*}
$$

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 $\left[(B-V)_{0} \approx 0^{\mathrm{m}} 74\right]$ W-type W UMa binary.

Table 1. Minima for ER Cep

| $E$ | $(O-C)_{1}$ | 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 |

${ }^{a}$ Determined in this paper from observations listed in the reference.
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Acknowledgment: * Participants in the Research Experience for Undergraduates (REU) program at Florida International University, sponsored by the National Science Foundation, grant PHY-9531353.

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