STATUS REPORT ON THE INTERNATIONAL CAMPAIGN OF
SIMULTANEOUS VRI PHOTOMETRY AND SPECTROSCOPY OF EI ERI = HD 26337

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In a previous issue of the IAPPP Communications, one of us (Strassmeier 1987a) requested that interested observers submit photoelectric observations of the RS CVn binary EI Eri. We would like to thank all of the observers who submitted data— a total of 13 groups of 19 astronomers contributed approximately 370 UBVRI observations, each a mean of three readings on the variable! In this paper we present the preliminary light curves resulting from this campaign; a more detailed analysis of the photometry will appear in a paper titled "Photoelectric Photometry of the RS CVn Binary EI Eridani = HD 26337" (Hooten et al. 1988).

A V-band light curve and V-I color curve containing data sets with small external scatter is shown in Figure 1. The solid line in the figure is an "eyeball" fit with a spot model to points before JD 2,447,150; the dotted line is the fit to data points obtained after JD 2,447,150. The total time spanned by the light curve is JD 2,447,120 through JD 2,447,180. Notice the rapid change of the light curve shape around phase 0.5. A light curve centered on 1988.13 shows only points which fall along the dotted line.

The combination of the small amplitude of the star (≈0.05 magnitude) and the large external scatter of the observations submitted by independent observers complicates the analysis of the entire data set. We have tried to tackle this problem by using a reduction procedure which shifts each individual observer's data relative to a Fourier fit to the combined data of the form:

\[ A_0 + A_1 \cos \theta + A_2 \cos 2\theta. \]

A V-band light curve derived from the entire data set by this technique, which will be discussed in the aforementioned paper by Hooten et al. (1988), is presented in Figure 2. An "eyeball" fit to this light curve places the full amplitude of the photometric variation in V during the period of observation at ≈0.06 magnitude. This amplitude is smaller than that displayed by EI Eri in the past (Fekel et al. 1982; Hall et al. 1987). The light curve exhibits
twin maxima, one near phase 0.3 the other near phase 0.7. The appearance of two maxima at such phase angles is indicative of at least two spotted regions displaced in longitude on the stellar photosphere. Further analysis by Strassmeier should result in a spot model of EI Eri whose parameters are better defined.

Figure 1. V,I light and color curves for EI Eri compiled from data with smallest external scatter. Key to symbols: (crosses) Vanderbilt 0.4-m APT; (filled circles) Barksdale; (open circles) Cutispoto at ESO; (open triangles) Grup D’Estudis Astronomics, Spain; (filled square) Soder.
The idea of spot modeling from exactly simultaneous multicolor photometry and high-resolution spectroscopy is challenging, but it provides the only means of testing the validity of model light curves. Spectroscopic observations were therefore obtained at Kitt Peak National Observatory and at National Solar Observatory, both near Tucson, Arizona, during 20 nights in December 1987 and January 1988. During this campaign EI Eri did not please the photometrists with its roughly 0.05 magnitude amplitude in V; previously amplitudes of 0.2 and 0.16 magnitudes were observed in 1985 and 1986, respectively. However, the line profile variations were fairly strong. Thus the star was probably still heavily spotted despite the small photometric amplitude. An example of a line profile obtained with the KPNO coudé feed telescope camera #5, grating A and TI-3 CCD is shown in Figure 3 along with the fit predicted by a theoretical spot model. Further analysis of the data will certainly give us some insight into the morphology of starspots.

![Graph](image)

Figure 2. V-band light curve of EI Eri compiled from Fourier fits of the entire data set.
The National Solar Observatory has granted additional telescope time on the McMath Solar Telescope for this project and we are continuing to monitor EI Eri spectroscopically. This is a so-called synoptic program, i.e., a resident observer (Paul Avellar of NSO) will carry out observations on the nights of October 15, November 14–17, 19–20, 24–29, December 12–17, 30–31, and during several nights in January and February 1989.

Observers in the northern and southern hemisphere at all geographic longitudes are again urged to obtain VRI photometry of EI Eri, a relatively bright (V max = 6.9 magnitude) spotted RS CVn type binary with a 1.945 day rotation period. For more specific information on this interesting star, e.g., which comparison and check star should be used, etc., see Table 1 in Strassmeier (1987a,b) and also Fekel et al. (1987), and Hall et al. (1987).

![Figure 3. CaI 6439Å line profile obtained with the KPNO coude feed telescope at phase 0.201 in December 1987. The line is one possible theoretical fit with a spot modeling computer program.](image)
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REFERENCES


