COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1618

Konkoly Observatory
Budapest
1979 June 5

COMPARISON STAR ADJUSTMENTS FOR THE CEPHEID EU Tau

EU Tau has become well studied after Guinan (1966) showed that it was a classical, short period cepheid of type Is. UBV observations include 28 by Szabados (1977), 45 by Wachmann (1976), 139 by Sanwal and Parthasarthy (1974), and 342 by Guinan (1972). However, the mean V magnitudes of all four sets of data disagree, in some cases by $0.^{m}13$. In addition, Guinan's results should have one day added to all dates due to an error in his computer program. Because of the low amplitude of this variable, disagreements of more than $\pm\ 0.^{m}02$ are obvious when data is combined.

The source of error in the mean values stems from magnitude determinations for the three common comparison stars. However, no single comparison star was measured by all four observers. For this reason, all three comparisons were reobserved, in the course of a survey of short period cepheids (Henden 1979a), with the 41 cm cassegrain telescope of the Morgan-Monroe State Forest site of Goethe Link Observatory. Results were obtained on three nights and were computed differentially with respect to four standard stars from the Arizona-Tonantzintla catalog (Iriarte, et. al. 1965) : HR 1908, HR 1946, HR 2010, and HR 2047, which spatially bracket the variable and its comparison stars. The new and previous measures for the comparison stars are presented in Table 1. By comparison of the derived magnitudes, the adjustments for each observer have been calculated and are given in Table 2.

Table 1. Comparison Star Magnitudes

	BD +18°939			BD +18°959			BD +18°966		
Observer	V	B-V	U-B	V	B-V	U-B	V	B-V	U-B
Guinan	-	-	-	7.72	0.42	0.11	7.90	1.02	0.93
Wachmann	-	-	-	7.60	0.446	0.105	-	-	-
Sanwal	8.41	0.35	0.09	-	-	-	7.77	1.09	0.90
Szabados	-	-	-	7.53	0.44	0.17	7.79	1.10	1.04
Henden	8.41	0.339	0.144	7.58	0.460	0.130	7.76	1.084	0.942
(p.e.)	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.02

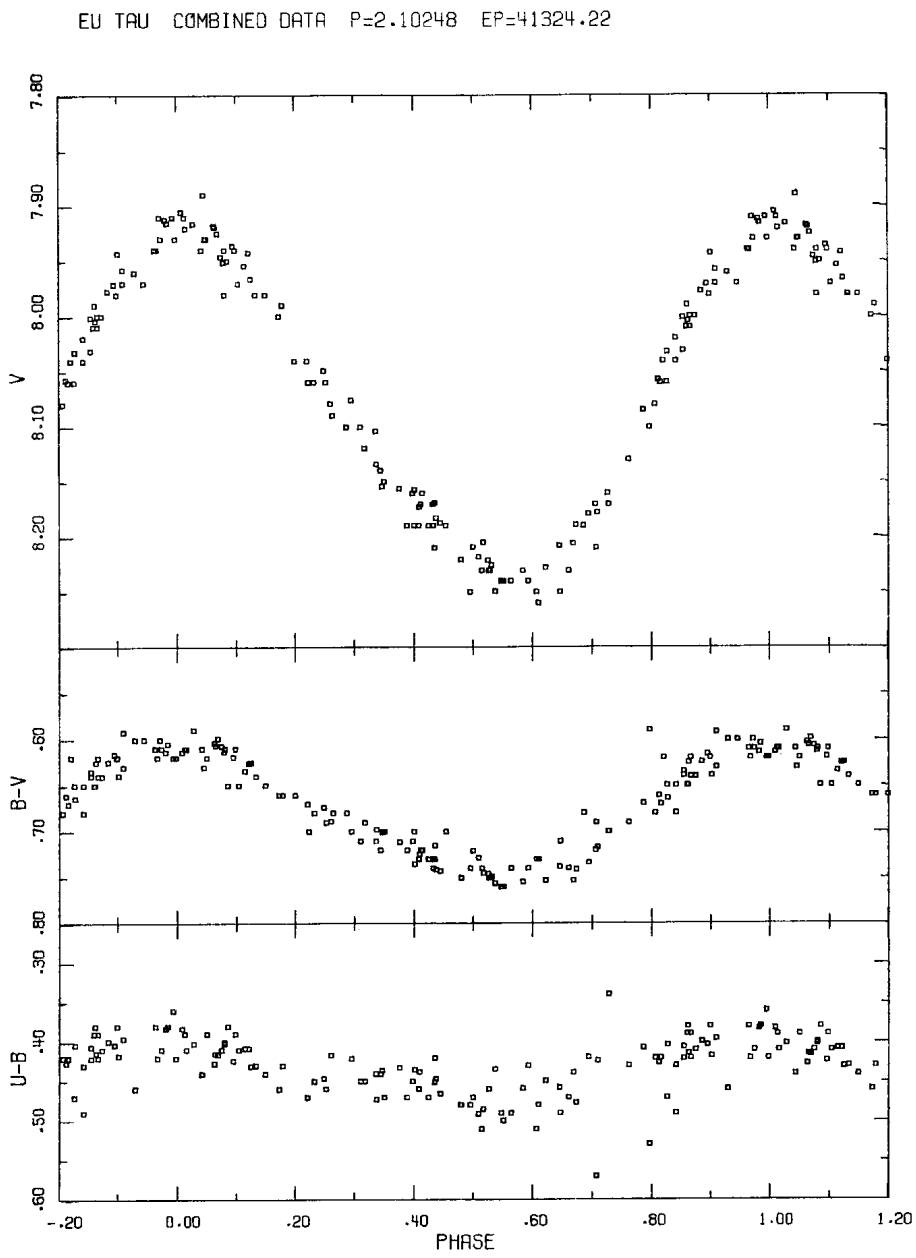

Figure 1 : EU Tau data after zero point corrections have been made.

Table 2. Corrections to Existing Data

Observer	V	B-V	U-B
Guinan	-0.14	+0.05	+0.01
Wachmann	-0.02	+0.01	+0.02
Sanwal	+0.00	-0.01	+0.05
Szabados	-0.04	-0.01	-0.07

The combined light curve after adjustments were made is shown in Figure 1. All data by Henden (1979b), Szabados and Wachmann are included, along with a random sample of 25 observations each by Sanwal and Parthasarthy and Guinan. The data is phased according to the light curve elements:

$$T_{max} = \text{J.D. } 2441324.22 + 2^{d}.10248\ E$$

The scatter has now been reduced to observational error limitations.

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