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ECLIPSE OBSERVATIONS OF AM Tau

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AM Tau (B8, V=10.4, $05^{\rm h}52^{\rm m}21\overset{\rm s}{.}37$, $+16°17'00''$, J2000) is a relatively bright but poorly studied eclipsing binary with a period of 2.04 days. A physical model for the system was determined by Brancewicz and Dworak (1980), but it was made on the basis of previous published spectral types, rather than a fit to the light curve. A linear ephemeris is also given in the SAC No. 67 (Danielkiewicz-Krosniak and Kurpinska-Winiarska, 1996, hereafter DK96). This note presents new observations of the time of primary eclipse, leading to an improved period estimate. We also present a simple physical model derived from a least-squares fit to the observed light curve.

We observed AM Tau using the University of Iowa's Automated Telescope Facility located in Iowa City, IA. The system consists of an 18cm refractor, a Spectrasource HPC-1 CCD camera (format 512×512 binned pixels, $3\overset{''}{.}00$ per pixel) and a Johnson R-band filter. We used the nearby stars GSC1312-2704 and GSC1299-0984 (R=10.05) as check and calibration stars, respectively. Each observation consisted of 50 second exposures of a 26.5×26.5 arcmin field containing AM Tau as well as the check and comparison stars. For each observing session, the exposures were repeated every 2 minutes for approximately two hours. Differential aperture photometry was performed by an automated procedure after aligning all images to a common reference. No color or air mass corrections were applied. We estimate that this results in less than 0.05 magnitude error using an R filter.

The five observing sessions occurred on 25, 29, 30 Sep 1997, 22 Oct 1997, and 25 Nov 1997. The observed time of primary minimum was HJD = 2,450,716.8098±0.0005. This implies a period P=2.043918±0.000002 days, using a reference time of primary minimum JD0=2,445,253.417 (DK96). Our period differs significantly from the value quoted by Danielkiewicz-Krosniak and Kurpinska-Winiarska (1996), P=2.043926 days. By combining all five observations, the basic shape of the light curve shown in Figure 1 was obtained. The data was fitted with a simple geometric model using spherical stars, circular orbits, and no limb darkening. Our data is represented with the solid line, while the calculations of Brancewicz and Dworak are used to plot a second light curve in the same figure with a dotted line for reference. Table 1 below summarizes the best-fit stellar parameters shown in Figure 1.

Table 1. AM Tau Model Parameters

Parameter	BD80	This Paper
Luminosity Ratio L2/L1	0.185	0.10
Ratio of Radii R2/R1	1.11	0.8
Ratio of Sep'n to R1	6.32	4.50
Inclination Angle	(90)°	90°

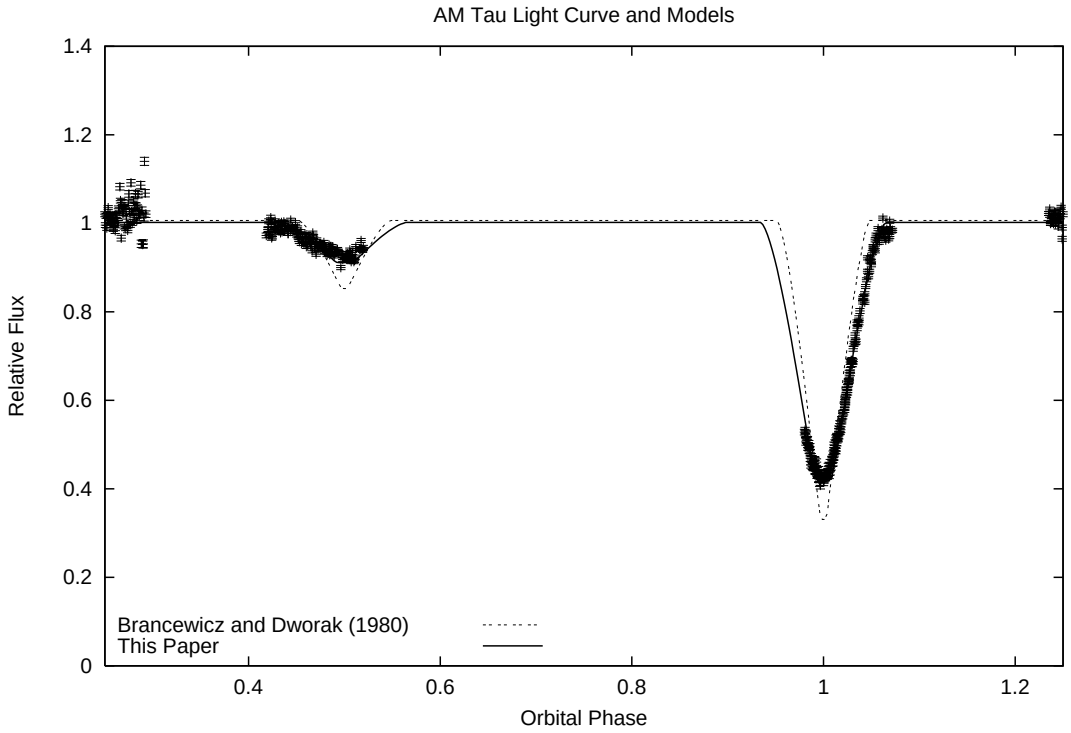

Figure 1. Observed light curve of AM Tau made by combining all five observations. The solid line is the expected light curve given by the model of this paper (Table 1), while the dotted line is from the model of Brancewicz and Dworak (1980)

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References:

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