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A NULL DETECTION OF RAPID OSCILLATIONS IN THE Ap STAR ET And

Panov (1985) reported the possible detection of rapid oscillations in the CP2 (Ap) star ET And (HD 219749, HR 8861), a B9p variable with a rotation period of approximately 1.62 days and also a short-period pulsational variable with periods most recently determined to be 0.09919 and 0.14795 day (Weiss *et al.* 1994). Panov's claimed detection of periods between 7 and 16 min prompted the need for additional observations to look for rapid oscillations.

Photoelectric photometry was obtained on three consecutive nights with the Lowell Observatory 0.8-m reflector. The journal of observations is given in the table below. Each integration was 20 sec through a narrow-band (4060Å, FWHM=70Å) filter with a central wavelength similar to Strömgren v. Breaks were taken only for sky measurements and recentering of the 20" aperture.

Table 1. Journal of observations of ET And.

UT date	Julian Day	Npts	σ	Δt [hr]
93-Sep-21	2449251	503	.0023	2.89
93-Sep-22	2449252	532	.0022	3.09
93-Sep-23	2449253	539	.0024	3.11
		Σ1574	<.0028>	Σ9.09

The times of observation were transformed to heliocentric Julian Day to 1-sec accuracy, and mean magnitudes were subtracted from each night's data after counts were corrected for dead time and sky-subtracted.

Analysis was performed via discrete Fourier transform (DFT) using Kurtz' (1985) modified version of Deeming's (1975) algorithm. Fig. 1 shows the amplitude spectrum of each night separately, and in the bottom panel, the combined data for all three nights. It should be emphasized that here, the y-scale is in *milli-magnitudes*, so the height of each separate panel is approximately 1.0 mmag. In particular, in the frequency range 90–205 c/d, corresponding to periods of 7–16 min, note the absence of any significant power. The upper limit is about 0.6 mmag for any individual night. It was about 0.45 mmag for all three nights combined. This is also the 5% false alarm probability level (Scargle 1982; Horne and Baliunas 1986).

Given that rapid oscillations in Ap stars are proportional to the magnetic field strength, the phase of the magnetic field and hence the star's rotation phase can play a significant role. With a rotation period of 1.61887 days (Scholz *et al.* 1985), it can readily be calculated that these data were obtained at *relative phases* of 0.0, 0.10, and 0.71 and so the maximum gap in phase is about 0.6. This precludes completely missing any more than about half the portion of the the phase where the magnetic field strength is at a maximum, and even less if there is magnetic polarity reversal. From only two magnetic field measurements published by Bohlender *et al.*(1993), it is unclear whether polarity reversal takes place or not.

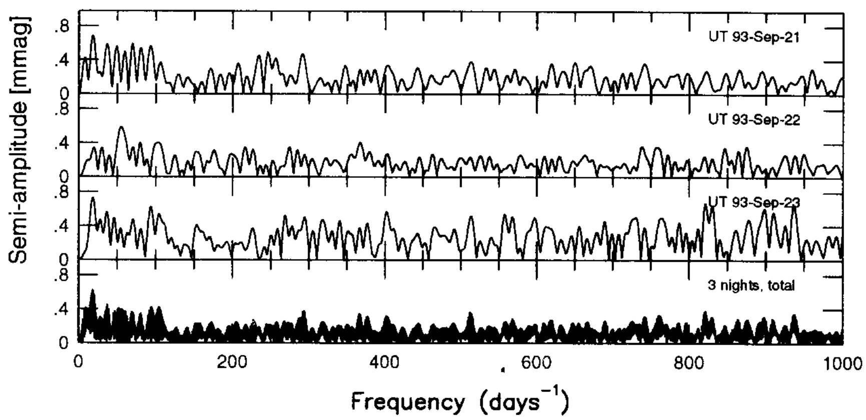

Fig 1. Amplitude spectra of the data from Table 1 for each separate night, and at the bottom, for all three nights combined.

We conclude that there is no evidence of rapid variability in ET And, and that if data are not obtained under excellent photometric conditions, spurious peaks in the period range reported by Panov (1985) could easily show up.

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