COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2825

Konkoly Observatory
Budapest
27 November 1985
HU ISSN 0374 - 0676

THE VARIABILITY OF ET And

The peculiar star ET And (= HD 219 749 = HR 8861) has been observed photoelectrically in the National Astronomical Observatory (Bulgaria) in 1981-1984 using the 60 cm telescope and the UBV photoelectric photometer. Our photometric observations reveal two different types of variability: periodic light variations with $P = 1^d.61887$, probably resulting from the rotation of the star, and $0^d.0994$ period light variations (with an amplitude of 0.01 - 0.02 mag) the origin of which is still uncertain. One possible origin of this variabillity could be pulsational instability.

The standard UBV magnitudes obtained in October 1984 are: $V = 6.45$, $B-V = -0.02$, and $U-B = -0.25$. These values are in good agreement with Crawford's (1963) photometry. Using the standard reddening law $E(U-B)/E(B-V) = 0.72$ we obtained $E(B-V) = 0.06$ and $E(U-B) = 0.03$. The unreddened colours of ET And therefore are: $(B-V)_o = -0.08$ and $(U-B)_o = -0.28$. The UBV data seem to indicate a location for ET And near or on the main sequence of B8 but UBV photometry is not well suited for determining the luminosity class. Crawford's (1963) Hβ photometry indicates a main sequence position of ET And, while other spectroscopic criteria (Scholz, 1985, private communication) show a position above the main sequence. The luminosity class of ET And is, therefore, still uncertain. Indirect evidence could be obtained from the photometric period of 1.6 days. We believe that this variation is due to the rotation of the star. From the 1.6 day period and the value of $v \cdot \sin i = 79$ km/s (Barylak and Rakos, 1983) the radius of the star can be derived: $R \approx 3R_\odot$ which is consistent with the main sequence position. In order to determine the T_{eff} of this star, we used the calibration of peculiar stars by Stepien and Muthsam (1980). Our photometry gives $T_{eff} = 10700^o - 10900^oK$, i.e. the star lies clearly outside the instability strip. This finding makes it difficult to interpret the 0.0994 day light variability as a pulsation (radial?) of the star. Furthermore, there are indications of rapid light variability with periods of the order of minutes. Fourier analysis of B and U data, obtained on four nights in November 1982 shows possible existence of

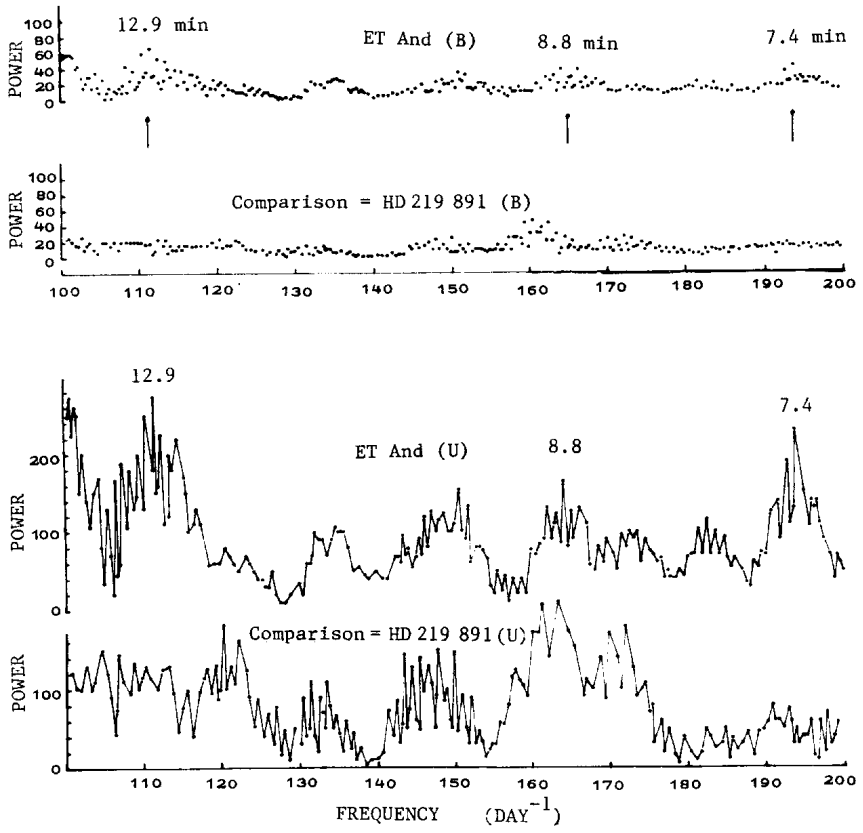

Figure 1

rapid light oscillations at f = 194 day^{-1} , corresponding to 7.4 min period (amplitudes: 0.002 mag in B, and 0.006 mag in U). In order to account for atmospheric effects the comparison star HD 219 891 was observed alternatively with ET And. For each star the total monitoring time was 11.5 hours and for each of them 199 points were obtained (in both B and U filters). We plotted the Fourier spectra for the frequency interval 100 - 200 day^{-1} separately for ET And and the comparison star in Figure 1. The method of Deeming (1975) was used. Since the comparison star was observed in the same conditions as ET And, all possible disturbances due to atmospheric and instrumental effects should be contained in the "comparison spectra". From Figure 1 another possible frequency of rapid light oscillations appears at about 13 min. Considering the small amplitudes of the rapid light oscillations, a confir-

mation of these results is needed. Rapid light oscillations in several Ap stars have been discovered by Kurtz (1982) and can be interpreted as non-radial pulsations at high overtones.

K.P. PANOV

Department of Astronomy and
National Astronomical Observatory
Bulgarian Academy of Sciences
72 Lenin Blvd, Sofia - 1184
Bulgaria

References:

Barylak, M., and Rakos, K.D., 1983, Astron. Astrophys., 127, 366.
Crawford, D.L., 1963, Astrophys. J., 137, 530.
Deeming, T.J., 1975, Astrophys. Space Sci., 36, 137.
Kurtz, D.W., 1982, Mon. Not. R. astr. Soc., 200, 807.