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PHOTOMETRIC OBSERVATIONS OF THE Be STAR ζ TAURI

The understanding of the physical behaviour of Be stars, from many points of view not yet clarified, is connected to the careful observations of single objects, during a time long enough to study quiescent and active phases. In this framework, we devoted much effort to the bright Be star ζ Tauri (HR 1910), collecting in these years a lot of spectroscopic and photometric data. Some spectroscopic conclusions, related to the period Jan 17-24, 1983, are reported in Guerrero et al. (1989); here we present the preliminary results about the photometric behaviour of this intriguing star.

ζ Tauri is a well-known binary system with $P=133^{\text{d}}.1$ (Jarad, 1987), which displayed both long-term shell instabilities (Delplace and Chambon, 1976) and short-term shell and photospheric variations (Guerrero et al., 1989). As regards the photospheric observations, several authors found brightness variations with amplitudes from some hundredths to about a tenth of magnitude (see, for example, Guo and Huang, 1986; Harmanec et al., 1980; Alvarez and Schuster, 1981). In particular, Bozic (1989) claims that the light variation time scale of ζ Tauri covers a range from several decades to few hours and that the periods for the rapid brightness variations are equal to $0^{\text{d}}.8$ and $1^{\text{d}}.6$.

We observed ζ Tauri with a digital photon-counting photometer attached to the 50cm reflector telescope of Merate Observatory, using Stromgren γ and β -narrow filters. Comparison and check stars were HR 1860 and 121 Tauri respectively. The observations were obtained in the period Jan 26-Feb 15, 1989: the excellent weather allowed us to collect 491 and 388 values of Δm (in the sense $m_{\text{HR1860}} - m_{\zeta\text{Tauri}}$) for γ and β -narrow filters respectively.

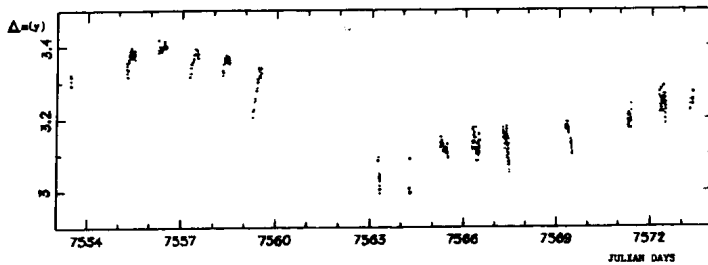


Figure 1

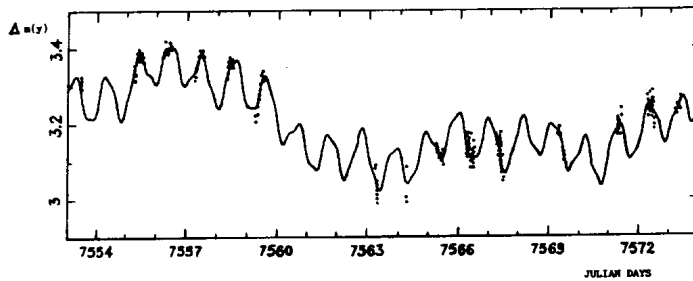


Figure 2

Figure 1 represents the Δm values in y filter versus Julian Days. As one can see right away, an oscillation with high amplitude (about $0^m.4$) and long period (several days) coexists with a shorter period and lower amplitude variation.

This lot of photometric data, besides very close in time, allowed us to perform a careful research of the possible periodicities. To this end, we used a method similar to that proposed by Vanicek (1971). The y and β -narrow data give the same

	γ (c/d)		a (mag)		ψ	
	γ	β -narrow	γ	β -narrow	γ	β -narrow
0.043 (P=23 ^d .256)	$\pm .001 \pm .029$		$0^m .106 \pm .003$	$0^m .088 \pm .060$	$-1.96 \pm .02$	$-1.92 \pm .25$
0.108 (P=9 ^d .259)	.001	.009	$0^m .058 .002$	$0^m .062 .014$.22 .03	.01 .26
0.944 (P=1 ^d .059)	.001	.003	$0^m .055 .003$	$0^m .053 .006$.90 .05	.90 .10
0.314 (P=3 ^d .185)	.002	.011	$0^m .023 .003$	$0^m .017 .006$	$-.26 .11$	$-.18 .29$
2.435 (P=0 ^d .411)	.011	.001	$0^m .011 .001$	$0^m .008 .002$.61 .13	.41 .32
0.706 (P=1 ^d .416)	.010	.002	$0^m .010 .002$	$0^m .009 .005$	$-1.97 .26$	$-1.29 .66$

TABLE 1

values of the periods, except $P=1^d.416$, derived from the β -narrow data. Table 1 summarizes the found frequencies ν , with the oscillation amplitudes a and the phases φ referred to $t_0=7564.7936$, together with the related errors for the two filters. At last, Figure 2 represents the $\Delta m(y)$ data with the synthesized light curve obtained for the six frequencies shown in Table 1.

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REFERENCES:

- Alvarez, M., Schuster, W.J.: 1981, *Rev. Mexicana Astron. Astrof.*, 6, 163
 Bozic, H.: 1989, private communication
 Delplace, A.M. and Chambon, M.T.: 1976, "Be and shell stars", ed. A. Slettebak, Dordrecht, Reidel, p. 79
 Guerrero, G., Bossi, M., Scardia, M.: 1989, *Astrophys. Space Sci.*, in press
 Guo, Z. and Huang, L.: 1986, 2nd Japan-China Workshop on "Stellar Activities and Observational Techniques", Kyoto, p. 35
 Harmanec, P., Horn, J., Koubsky, P., Zdarsky, F., Kriz, S., Pavlovski, K.: 1980, *Bull. Astron. Inst. Czechoslov.*, 31, 144
 Jarad, M.M.: 1987, *Astrophys. Space Sci.*, 139, 87
 Vanicek, P.: 1971, *Astrophys. Space Sci.*, 12, 10