"Stellar magnetism" International Conference Proceedings, 1992, 201-203.

THE MAGNETIC FIELD OF THETA AUR: PRELIMINARY RESULTS

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In recent years the star Theta Aur was one of the most frequently studied magnetic stars by spectroscopic methods; the rotational period of Theta Aur is approximately 3.6 days and it is possible to obtain quickly the observational phase coverage since the star is bright. The chemical elements are inhomogeneously distributed over the stellar surface and some maps for element inhomogeneities using Doppler imaging technique were derived by different authors (Khokhlova et al., 1986; Rice and Wehlau, 1991; Hatzes, 1991). The effective magnetic field strength H^, measured in the wings of hydrogen lines by a photoelectric technique is rather small as compared with the classical magnetic spectrum variables: -240 - +360 Gs (Borra and Landstreet, 1980). Untill now, because of the relatively large line width (~ 1 Å) and their complex structure, the effective magnetic field strength in metallic lines has never been measured yet.

We tried to measure H_e by Babcock's photographic technique, using SiII, FeI,II, CrI,II, TiII lines. 9 Zeeman spectrograms in the spectral region from about λ3800 Å to λ4650 Å with a reciprocal linear dispersion of 4 Å/mm were taken with the 2-m universal telescope at Tautenburg/Jena in the years 1989 and 1990. All spectrograms were measured with the modified version of the Abbe comparator of the Institute of Astrophysics at Potsdam.

The line profiles show a very complex behaviour. To measure the effective magnetic field strength on such broad variable metallic lines, it is possible to use in certain cases the inhomogeneities of chemical elements. In the case of the magnetic spectrum variable star Epsilon UMa, spectral lines of certain elements in the spectrum show in their spectra clear splitting in the rotational phases when the regions of enhanced element concentration, connected with magnetic poles, appear at the opposite stellar limbs. H_e was determined separately for both the long and short wave-

length components of the split spectral lines (Hubrig, 1988). Spectral lines in our Zeeman spectra of Theta Aur show clearly a splitting in the rotational phase 0.79 where a positive effective magnetic field up to 900 Gs was measured.

The measurements of the magnetic field of the star in different rotational phases are presented in Table 1.

Table 1.

Ephemeris: 244 6337.^{d}972 + 3.^{d}6187 E			
JD 2440000 +	Phase	H_e ± σ(Gs)	
7546.339	0.92	+1375 ±375	
7549.485	0.79	+ 914 ±672 short	wavelength components of the split spectral lines
		+ 509 ±832 long	
7555.286	0.39	- 522 ±206	
7868.525	0.96	+1150 ±508	
7871.525	0.79	+ 818 ±326	
7924.440	0.41	-1269 ±336	
7928.364	0.49	- 896 ±389	
7959.274	0.03	+1301 ±394	
7959.334	0.05	+1081 ±668	

In consequence of the small number of spectrograms as well as the large scattering in the detected effective magnetic field strengths there is a definite need of studying the magnetic field in Theta Aur by obtaining high signal-to-noise data. For this purpose in the last year a number of CCD spectra using a polarimeter were obtained in the Crimean Astrophysical Observatory. Some spectra are presented in Fig. 1. The treatment of this new observational material is in progress.

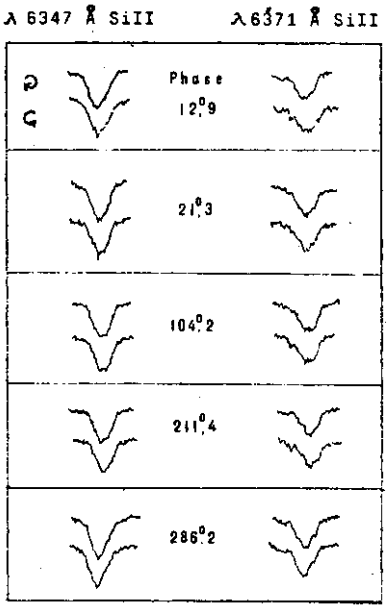

Fig. 1. Some CCD spectra taken with Zeeman analyzer at the 2.6 m telescope in the Crimean Astrophysical Observatory.

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