THE INVESTIGATIONS OF VARIATIONS IN THE DEPRESSION λ 4200, λ 5200 OF THE MAGNETIC STARS 53CAM AND BETA CrB.

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INTRODUCTION.

During many recent years, from 1973, the search for short-term variations in the spectrum of Ap-stars has been carried out at the Crimean Astrophysical Observatory. Some results are presented in the poster dedicated to 53CAM observasions. Spectral observations of the magnetic star 53CAM with time resolution of about 1 min were supplemented by the narrow-band photometrical observations within the framework of the cooperativ program of the magnetic stars observations, started in 1979.

I. OBSERVATIONS.

Narrow-band photometric observations are realized with aid of spectrophotometer. The band width is $\Delta\lambda = 30$ Å centered at $\lambda_c = 4220$ Å and $\lambda_c = 5220$ Å.

II. OBJECTS.

53CAM (A2p, $6^m.02$) and Beta CrB (F0p, $3^m.47$) was observed by the differential method (comparison stars are HD 65301 and γ CrB). Each estimation of the brightness $\Delta m = m_c - m_v$ was $\Delta t = 2$ min long.

III.A. RESULTS OF 53CAM OBSERVATIONS.

The analisys of observations (16 nights, total N=849) show: 1) The variations are complex, which can be described by a sum of three sinusoids with periods $P_1 = 20.1400$, $P_2 = 27.5828$, $P_3 = 79.2381$, reaining in phase during more than a year. (Edition Sov. Let. Astron. J.v.9, 286, 1983). 2) The amplitudes of each of three oscillations vary with

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the stars rotation phase.
3) In the framework of the cooperative program "R.V." of 53CAM the following results were obtained other observers:
a) narrow-band photometry (Kuvshinov,Plachinda, Sov. Lett. Astron.J.,vol.6,368,I980) in the core of H and K CaII lines shows variations with the time 20-30 minutes.
b) photometrical observations of Panov K.P.(I982,Comm.from Konkoly Obs.,83,I85) in the spectral region U,B,V show the variations with the periods: P_1 = 36, P_2 = 23, P_3 = I8.7, P_4 = I6, P_5 = II min.(3 nights, N=345).
c) photometrical observations of Zverko J.(I982,Bull.Astron.Inst. Czechosl.33, 3I4) in λ_c = 5260 Å, $\Delta\lambda$ = I90 Å during 4 nights with the total number of observations 535.

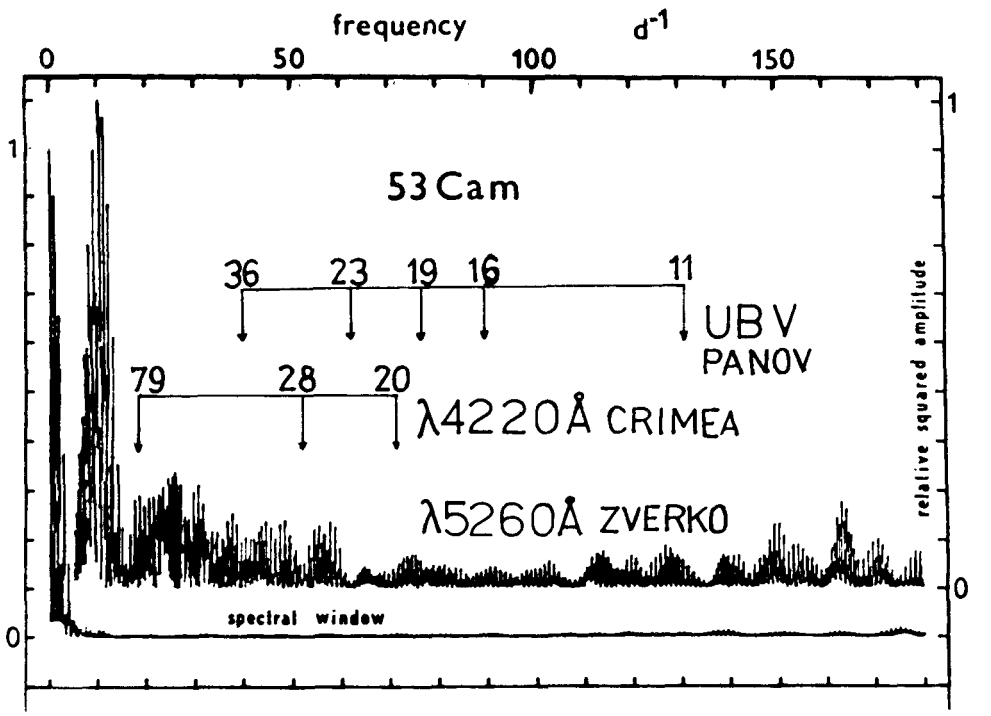

Figure I. The results of different observers: I) the power spectrum and the function of spectral window from data of Zverko; 2) the arrows show the positions of most signifi - cant peaks of power spectrum from Crimean data and the data of Panov. The numbers indicate periods in minutes.

The picture shows that in all probability the multiperiodicity exists and the most probable periods are P_1 = 20, P_2 = = 28 minutes.

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Unfortunatly there was no an observational night common for all the participants of the program. Evidently the lack of observations does not permit us to draw any reliable conclusion.

III.B. RESULTS OF BETA CrB (will be published in IBVS).

The observations of BETA CrB were carried out during ten nights from I8.05 till 6.06.I984,(total N=55I). It has been found that the flux variations do exist and could be described by a superposition of three sinusoidal oscilations with the periods P_3 = I96.9, P_2 =I58.3 and P_1 = 58.6 min. The power spectrum and function of spectral window were obtained by the method of Diming. They are presented in fig.2.

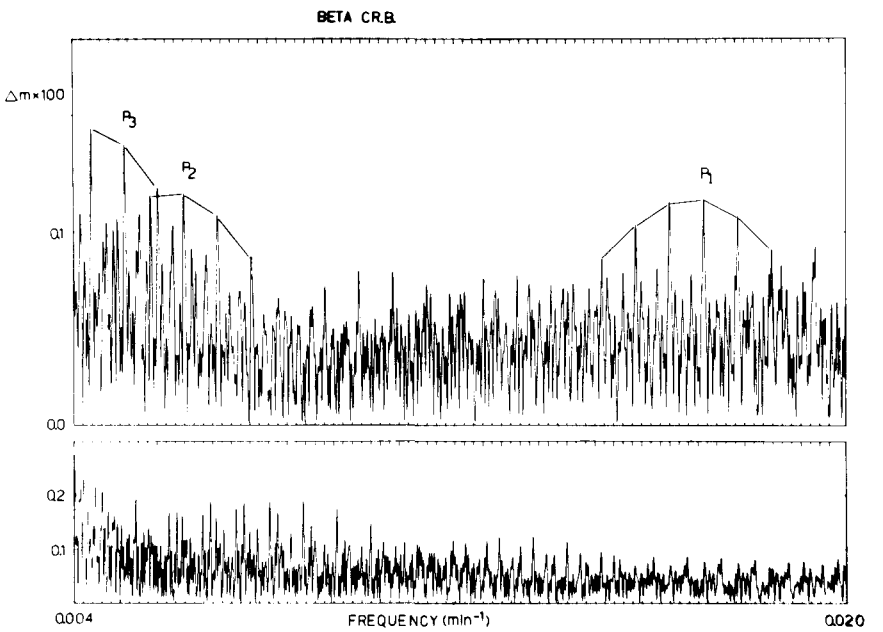

Figure 2. The power spectrum for the data on BETA CrB. P_1 ,P_2 ,P_3 — are the most significant periods.

The absence of any significant peaks in the function of spectral window for periods around P_1 ,P_2 ,P_3 and the presence of conjugate periods determined by the time gaps of siderial day confirm the reliability of the obtained results.

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CONCLUSION.

There are two types of brightness variations of 53CAM in the depression λ 4200 and BETA CrB in the depression λ5200, namely:

a) Complex multi-periodical variations of Δ m during one night, which might be caused by pulsations of stars with complex structure of atmosphere and high photosphere and magnetic activity of star.

b) Variations of Δ m with the phase of star rotation is well pronounced and might be explained in terms of oblique rotator model.

For 53CAM and BETA CrB the average values of Δ m for one night and magnetic field variations with the period of star rotations are compared in fig. 3.

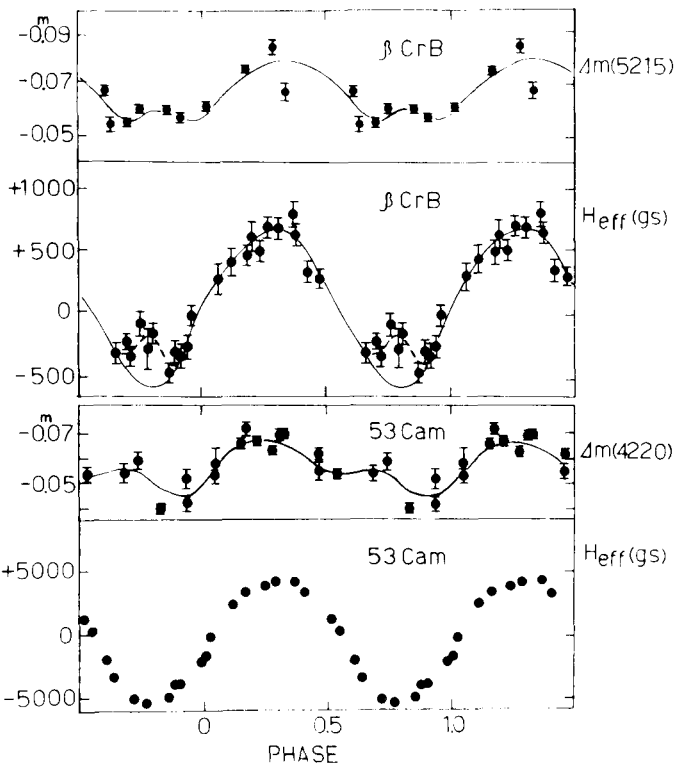

Figure 3. The variations of the depression λ 4200 for 53CAM and the depression λ 5200 for BETA CrB with the phase of rotation, and comparison with the magnetic field variations.

The picture shows a good correlation and indicates that maximum strengh of the depression λ 4200 for 53CAM and the depression λ 5200 for BETA CrB is related to the regions of magnetic poles.

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