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VARIATIONS OF THE RADIATION FLUX FROM THE MAGNETIC VARIABLE STAR β CrB IN THE DEPRESSION λ 5200 Å

A famous chemically peculiar star β CrB (F0p, $V=3^m.47$) was observed by using the spectrophotometer in the range $\Delta\lambda=30$ Å, being centered at $\lambda_c=5215$ Å falling into depression at λ 5200 Å.

The observations were carried out during ten nights, from 18 May till 6 June 1984. The star γ CrB was adopted as a comparison star. The differential extinction of β CrB versus γ CrB was accounted upon. The value of the atmospheric extinction was estimated with respect to the star η UMa. The brightness magnitudes of β CrB and γ CrB were estimated alternatively, 1.0 minute long each. As a result of the observations, we obtained the values $\Delta m=m\gamma-m\beta$ with the time resolution 2 min.

The periodic variations were searched for during all the 10 nights (total number of measurements was N=551) within the interval 50-500 min. The basic methods used were those of Yurkevich (1971) and Deeming (1975). It has been found, that the variations of radiation flux do exist and could be described by a superposition of three sinusoidal oscillations with the periods $P_1=196^m.9$, $P_2=158^m.3$ and $P_3=58^m.6$.

The values of amplitudes being estimated by the method of Yurkevich and Deeming are in good agreement and correspond to $A_1=0^m.005$, $A_2=0^m.004$ and $A=0^m.004$ for P_1, P_2 and P_3, respectively. The power spectrum and the function of spectral window obtained by the method of Deeming are presented in Figure 1. At the top the mean curve of Δm variations is shown for the above indicated periods calculated by the method of Yurkevich. Absence of any significant peak in the function of spectral window for the periods around P_1, P_2 and P_3 on one hand and presence of the conjugate periods determined by the time gaps of sidereal day confirm reliability of the obtained results.

In Figure 1 the conjugate and basic periods are connected by a solid line. The averaged values of $\overline{\Delta m}$ for one night and the magnetic field variations with the period of the stellar rotation are compared in Figure 2.

Finally we have come to a conclusion that there exist two types of brightness

variations of β CrB in the range of λ 5200 Å. They are: a) well - pronounced variations of $\overline{\Delta m}$ with the phase of star rotation that can be properly explained in the frames of an oblique rotator model (see Figure 2) and b) complex quasi-periodic variations of Δm during one night, which might be caused by pulsations of this star.

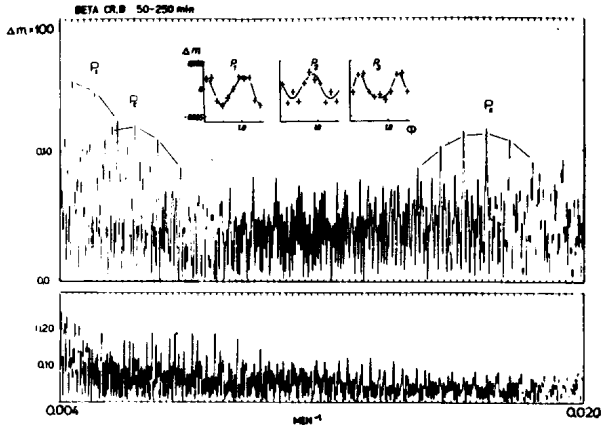

Figure 1

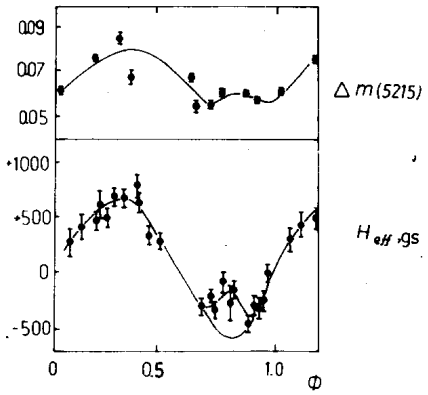

Figure 2

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