ON THE MAGNETIC FIELD OF β CrB

S.I.Plachinda

Crimean Astrophysical Observatory
Nauchny, Crimea, SU - 334413, USSR

ABSTRACT. We have discussed the oscillations of the magnetic field (H_e) of β CrB with a period $P_2=P_1/5=3^d.6974$, where P_1 is stimulated by a rotation of the star. The analysis of other author's measurements has been confirmed the reality of P_2.

The mean value of the longitudinal component of the β CrB magnetic field was measured in a separate spectral line λ4520.2 FeII (Borra and Vaughan 1977) and in λ4923.9 FeII line, single measurement (Landstreet 1982). But since β CrB is a magnetic Ap-star of SrCrEu type, it seems mostly reasonable to measure the H_e in one of the peculiar elements line. Such a kind of measurements were carried out for the first time by A.B.Severny (Severny 1970; Severny et al. 1974) in the photoelectric observations of the magnetic stars in λ4254.33 CrI line.

We have measured the H_e of β CrB in λ4254.33 CrI line. The observations were realized using the magnetometer ZTSh of the 2.6-m telescope of the Crimean Astrophysical Observatory. For three nights the measurements were carried out on the 6-m telescope of SAO. The data were reduced by the formula (Plachinda in press):

$$\Delta\lambda_H = \int_{\Delta\lambda_1}^{\Delta\lambda_2}(N_1-N_2)\,d(\Delta\lambda) \Big/ \int_{\Delta\lambda_1}^{\Delta\lambda_2} \partial N/\partial\lambda\, d(\Delta\lambda),$$

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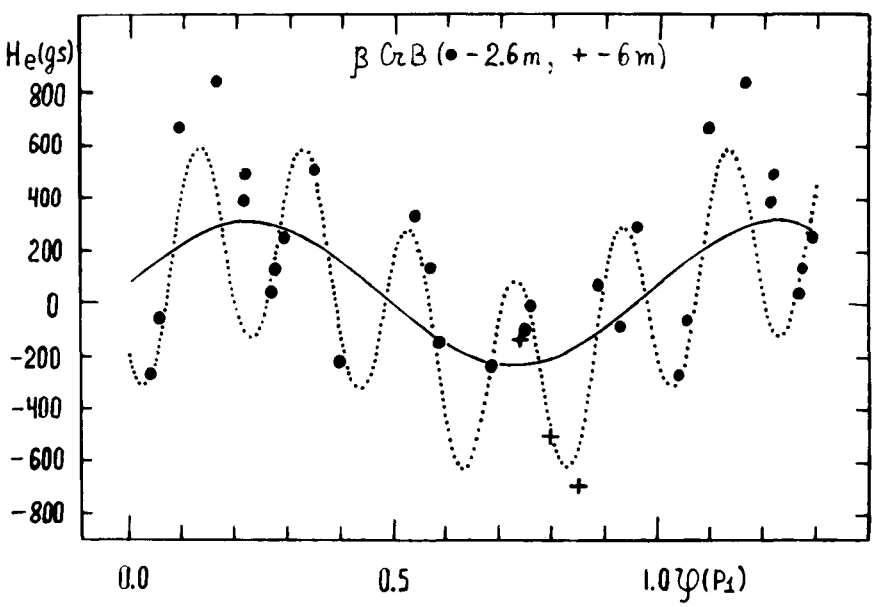
where $\Delta\lambda_H$ is a magnetic splitting, N_1 and N_2 are the intensities for the wavelength in question of the orthogonal polarized light fluxes, $\partial N/\partial\lambda$ is the weight function of V-parameter.

For 23 dates of observations, we have made 126 estimates of H_e for β CrB. Fig.1 shows the value of H_e averaged according to dates. To compute the phases we used the ephemeris published by Preston and Sturch (1967). The sinusoid calculated by the least square method is indicated here by a solid line. The deviations of H_e were calculated with respect to this line and the rest range of values was subjected to the analysis in order to search for the presence of periodicity. Fig.2a shows the behaviour of ΔH_e with the period

Fig.1



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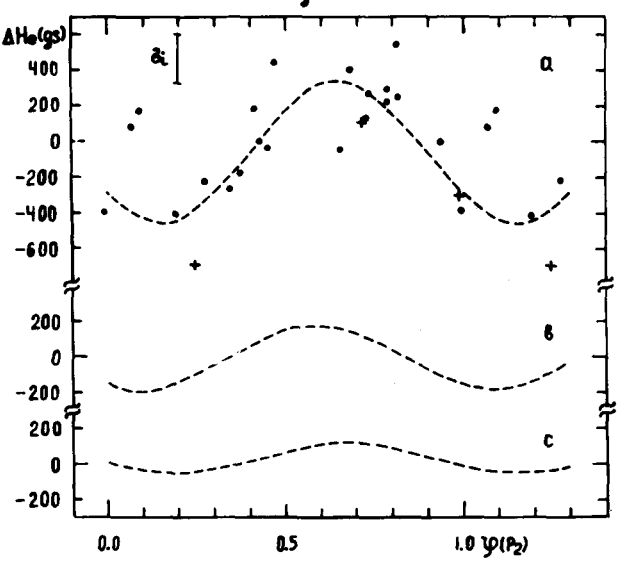
$P_2=P_1/5=3^d.6974$, for which $2A/\delta \simeq 3.1$ ("A" is the amplitude of a period). The zero epoch is the same as for the 18-d period (Preston and Sturch 1967). The superposition of periods P_1 and P_2 is presented in Fig.1 by a dotted line.

The same type of analysis was applied for the H_e measurements in λ4254.33 CrI line (Severny et al. 1974) and in λ4520.2 FeII line (Borra and Vaughan 1977). The approximation curve for P_2 according to the data published by Severny et al. (1974) is shown in Fig.2b and according to data published by Borra and Vaughan (1977) - in Fig.2c. The phase correlation of the three curves (see Fig.2a,b,c) supplies a completing evidence for the reality of the period P_2 = $=3^d.6974$ existing alongside with $P_1=18^d.487$ for the star β CrB.

Fig.2



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Discussion appears after the following paper.

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