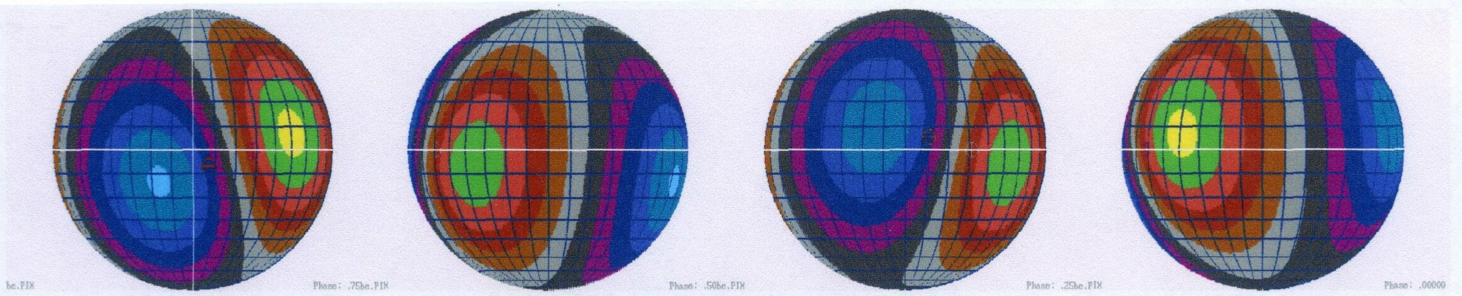
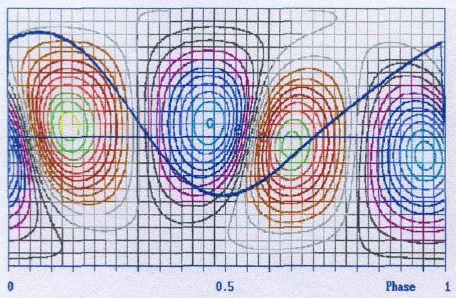
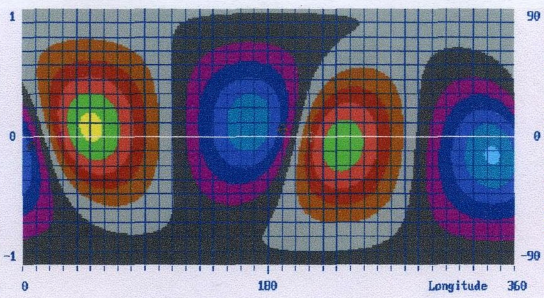
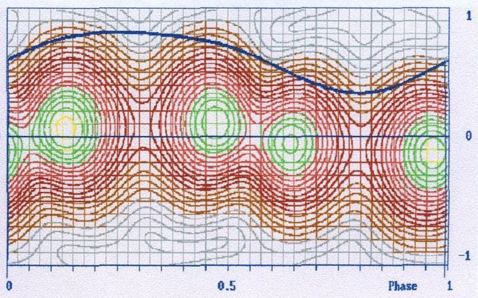
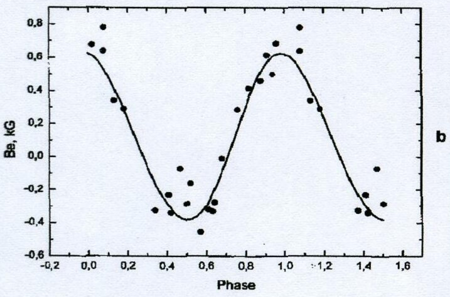








Phase curve of the effective magnetic field B_e calculated by fitting to the observational data from Borra & Landstreet (3) – see below.
The phase diagram is coordinated to the map of the magnetic field distribution on the surface by the rotation of the star.
The polarity of the poles is indicated by colors.

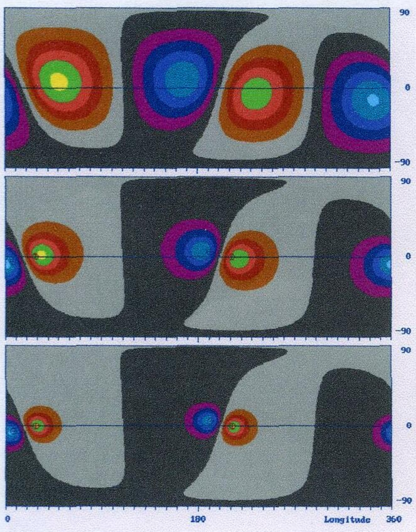


Phase relation of the effective magnetic field strength for βCrB using the observational data of Borra & Landstreet (3)

Above: Mercator-map and four globes to the phases 0, 0.25, 0.5, 0.75 of the calculated magnetic field distribution resulting from the quadrupole set of parameters (Q - relative units):

No	Q	r	φ	δ
1	−1	0.3	351	-6.5
2	+1	0.3	12	0
3	−1	0.3	176	5.3
4	+1	0.3	196	0

Below: Maps of the magnetic field distribution on spherical shells inside the star at the radii r=1, r=0.5, and r=0.4. Structure of the interior field.



A Quadrupole Model of the Magnetic Field of βCrB

Yu. V. Glagolevskij and E. Gerth

A quadrupole model of the magnetic field of the star βCrB is constructed on the base of the method of the ***"Magnetic Charge Distribution"*** (4, 5), which is fitted to the observations of Borra & Landstreet (3), Mathys et al. (7), and Wolff & Wolff (8) but deviates from the model proposed by Bagnulo et al. (1, 2).

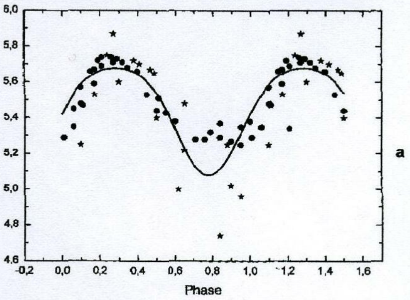
The magnetic field is described by superposition of two decentered dipoles (see Landstreet, 6), which are arranged in the equatorial plane perpendicularly to the axis and oppositely directed to the center of the star. The dipoles produce on the surface four magnetic spots with a maximal magnetic field strength at the poles of B_p = 14.5 kG. The declination angle of the rotation axis to the line of sight is i = 8° to 15°.

In consideration of all aspects the idea is advanced of very strong influence of an inhomogeneous distribution of chemical elements onto the measurable phase curves of the effective magnetic field. The star apparently has passed the convective phase in an early stage of evolution. Thus, the magnetism of the star could have been generated very early by the action of a dynamo and then has been preserved.

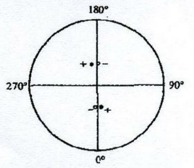
Regardless of all already proposed models of the magnetic field of βCrB, we attempted to reproduce the modeling applying our method of the *"Magnetic Charges"* for comparison, so hoping to get more insight into the origin of the magnetic field and its structure on the star's surface and - as far as the reduction of the observable surface field to its virtual sources can be taken valid - also into its interior.

1) Bagnulo S., Landolfi M., Mathys G., Landi Degl'Innocenti M., 2000, in: Magnetic fields of chemically peculiar and related stars, Eds.: Glagolevskij Yu.V., Romanyuk I.I., Moskow, p.168
2) Bagnulo S., Landolfi M., Mathys G., Landi Degl'Innocenti M., 2000, A&A, 358, 929
3) Borra E., Landstreet J.D., 1980, AJ Suppl., 42, 421
4) Gerth E., Glagolevskij Yu.V., Scholz G., 1998, Contrib. Astron. Obs. Skalnaté Pleso, 27, 455
5) Gerth E., Glagolevskij Yu,V., 2001, in: Magnetic fields across the Hertzsprung-Russell diagram, Eds.: Mathys, G., Solanki S.K., Wickramasinghe, D.T., Vol. 248, Santiago de Chile, p. 333
6) Landstreet J.D., 1980, AJ, 85, 611
7) Mathys G., Hubrig S., Landstreet J.D., Lanc T., Manfroid J. 1997, A&A Suppl.Ser. 123, 353
8) Wolff S.C., Wolff R.J., 1970, Ap.J., 160, 1049

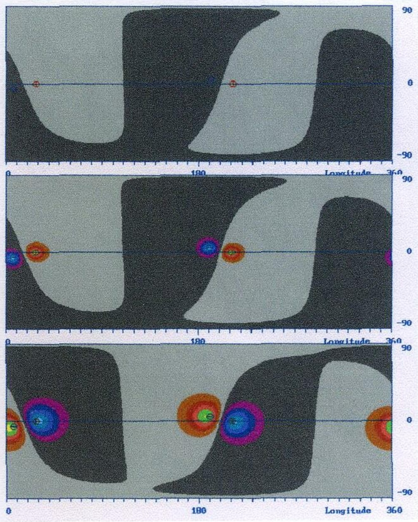
Phase curve of the averaged surface magnetic field B_s calculated by fitting to observational data - see below. The phase curve reflects roughly the arrangements of the poles.
The magnitude is positive for Bs as the quadratic sum of the 3 components of the magnetic field vector. (Curve shifted by –2 to the ordinate)



Phase relation of the average field strength B_s for βCrB using the observational data of Mathys (7) (dots) and Wolff & Wolff (8) (asterisks).



Scheme of the distribution of the magnetic point-like sources inside the star (view from the pole).
Below: Maps of the magnetic field distribution on spherical shells inside the star at the radii r=0.3, r=0.4, and r=0.2. At the singularity by r=0.3 the field strength reverses its polarity.



Poster representation at IAU Symposium 210 in Uppsala/Sweden, 17-21 June 2002