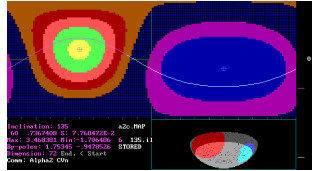


# $\alpha^2$ CVn

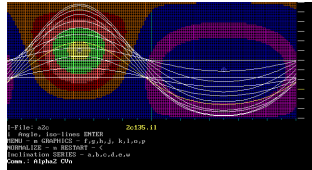
## Demonstration of a Computer Program for the Calculation of the Integral Magnetic Field in Stars



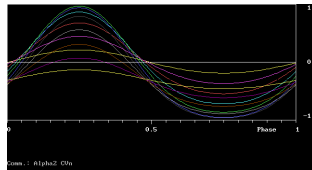
The diagram shows the usual aspect of the monitor screen. The field areas are marked by colors. The pole positions are the locations of the field sources, which may deviate from the field extrema on the surface. The coordinates correspond to the element areas. The rank of the matrix is 72. The phase curve is taken for an inclination angle of  $i = 135^\circ$ . The (violet) curve is interrupted by a longitude  $\phi = 60^\circ$  and then continued (white). This is the momentary aspect of the star with its positive (red) and negative (blue) poles. During the computation of the curve this figure is rotating. Some information is given about the field strength at the poles (Bp), the extrema of the curve and a comment about the object ( $\alpha^2$  CVn).

The program allows a lot of different picture representations. The usual aspect above (black background) is sufficient for computing but does not economize with ink by printing. In this connection black-white printing is preferred that we use in our other posters. The data are stored and may be reproduced anytime.

The stored maps and curves are recalled to the screen as we show in the following two examples:



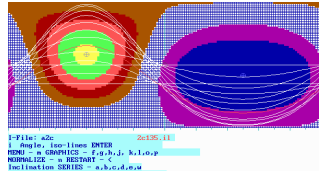
Here the coordinate net is used for limiting of the elements and for the colored areas of the map. The curves are white but may be replaced by colored ones.



The curves may be recalled, put together, compared and colored singly with an arbitrary background of the map.

The coordinate net can be changed from the map in flat projection (degrees) to a phase diagram (part of unity).

A suitable representation uses a white background and full colors for the iso-areas. The group of (white) curves are computed for different inclination angles with the step width  $15^\circ$ . But they might be distinguished easier at the monitor screen. The red curve is that for  $i = 135^\circ$ . The menu allows various manipulations.

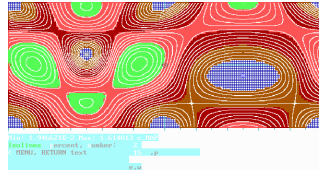


For the construction of the map we used the observational data from Tautenburg (see poster of Glagolevskij, Hildebrandt, Gerth, Lehmann, Scholz; there we used only the H-line measurements from Borra and Landstreet), which could be fitted satisfyingly by the following parameters of the location of the magnetic sources:

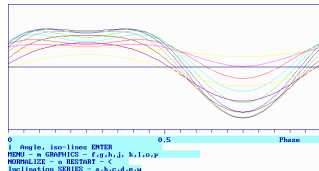
No	Source strength	Rad.	Lon.	Lat.	Jul. Dat.	Phase	Magn.field
1	3.3	.1	90	15	494.6544	.333	940
2	-3.3	.1	270	-15	496.6417	.697	-720
3	-4.5	.1	0	0	528.5088	.523	1070
4	4.5	.1	90	15	556.4228	.627	-500
5	-4.5	.1	180	0	558.4159	.994	-990
6	4.5	.1	270	-15	559.4516	.180	-530
					583.3761	.555	690
					585.3445	.914	-960
					586.3886	.105	-920
					588.3624	.466	1340

The magnetic field is measured in *Gauss. Rad.* is the fraction of the star radius. The magnitude of the source strength is *magnetic field strength x surface* ( $b^2 r^2$ ). The multipole structure is combined by 3 dipoles, 2 of them forming a quadrupole. Here we demonstrate above all the method. Because of the poor data set this result is not conclusive. Later on more data should be taken into account.

The famous star  $\alpha^2$  CVn shows its magnetically attractive face now.



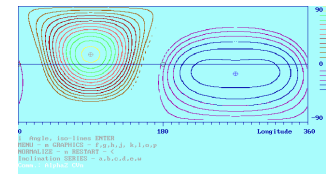
Horizontal surface field (sum of the quadratic vector components  $\phi$  and  $\delta$ ).



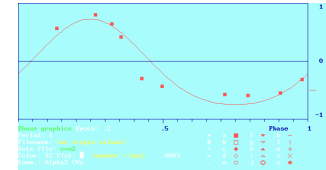
Phase curves of the horizontal field showing a dip at the positive pole.

The corresponding maps and phase curves may be combined differently. A blue background is a property of the applied compiler but proves to be useful.

## 100 years under observation



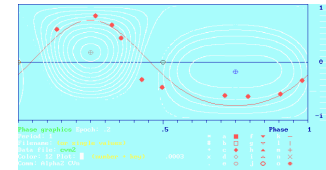
Map with colored iso-lines. The lines may be drawn singly or in groups.



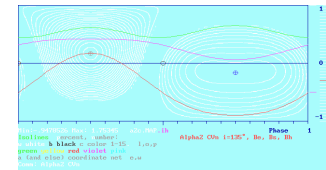
Phase arrangement for the plotted observational data fitted to the phase curve with an inclination angle  $135^\circ$ .

The menu of plots allows to distinguish between groups and special observational data. The plot figures may be chosen by character, color, and size. They could even be combined by repeated application. Optimization is possible by the least square method of the deviation of the observational data from the curve.

In the combination some features may only weakly be hinted - as here the map.



The plots are here combined by squares and rhombs.



The phase curves for the effective Field  $B_e$  (red), the surface field (green), and the horizontal field (violet) are combined for comparison in a phase diagram with the back-ground map. For a better arrangement the curves are shifted by 0.5.

The menu allows the choice of single or groups of iso-lines, colors, and text. For a short comment at the right side a line is left.

**The program is in further development and completion.**

Poster Representation at the *26th Meeting and Workshop of the European Working Group on CP Stars* in Vienna, Austria, October 27-29, 1997  
The poster is reconstructed from the original diskettes preserved since the conference in 1997 - without any changing overworking of the content.