# THE MAGNETIC FIELD AND OTHER PARAMETERS OF THE CHEMICALLY PECULIAR STARS

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1. The surface field $B_s$ ( but not the effective $B_e$ one ) is responsible for different processes occuring in the magnetic stars atmospheres. For this reason it is natural that different investigators are interested in working out and improving methods of determination of $B_s$. Especially great attention attracts the method based on using the multicolor Geneva photometry [1] . Cramer and Maeder have found a dependence between $B_s$ and parameter Z of multicolor photometry wich they use for the estimation of the surface field. But it is necessary to investigate this method before application. Due to this reason we have put the following two problems:

A - The search for stars with a maximal predicted field

B - Examination of calibration of $B_s$ (Z).

On the 6-m telescope we have received the spectrograms of 20 Cp stars with the maximal predicted magnetic field. Indeed, in 14 of them we discovered at first the magnetic fields and HD 147010 appeared to have an unique large $B_e$ 4000 Gs in maximum ( independently, Brown et al. made one estimation of $B_e$= 5050 Gs [2] ). We calculated $B_s$ for 70 magnetic stars on the basis of our own measurements and literature data using Stibbs-Preston method ( dipolar field ). A part of these stars are given in the Cramer-Maeder list. A comparison of $B_s$ from these two lists showed that a half of them corresponds to the calibration of Cramer-Maeder and another half does not correspond to ( Fig.1 ). The main parameters: $T_e$, pecularity type, mean period P, declination angle i, declination angle of the pole axe are absolutly equal in both groups. There is a difference only between v sini because of distinction of $V/R \sim \Omega$ . It means, that the mean angle velosity of stars which does not correspond to the Cramer-Maeder calibration, is three times smaller. The reason of this effect is unclear.



*C. R. Cowley et al (eds.), Upper Main Sequence Stars with Anomalous Abundances, 33–36.*

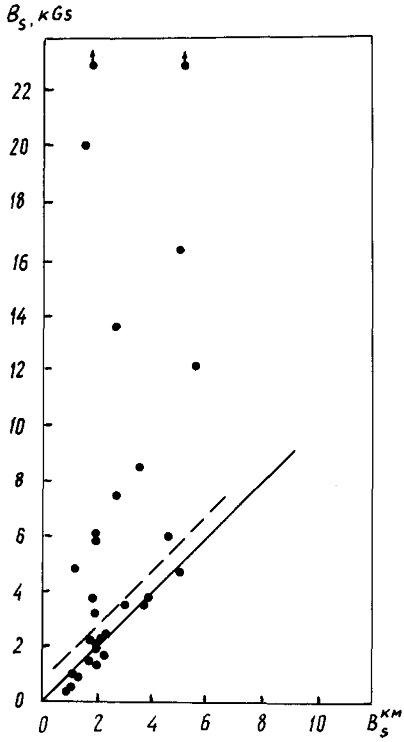
$B_s$, кGs
22
20
18
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
$B_s^{KM}$

Fig. 1

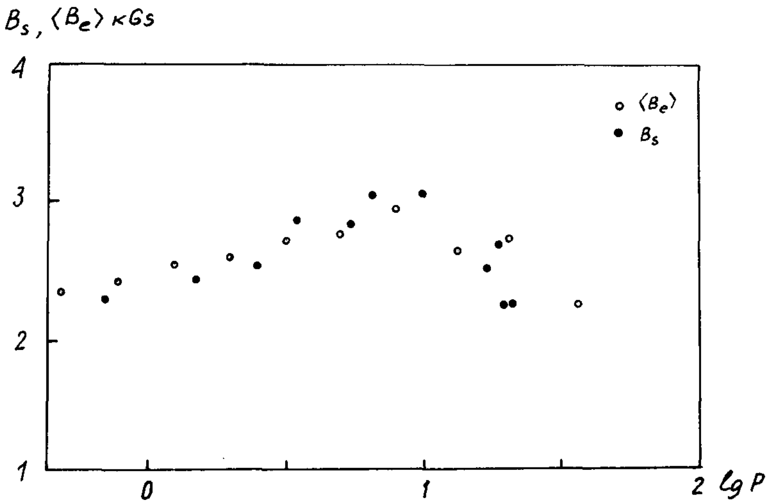
$B_s$, ⟨$B_e$⟩ кGs
4
3
2
1
0
1
2 lg P
⟨$B_e$⟩
$B_s$

Fig. 2

TABLE 1

| | $\bar{P}$ | N |
|---|---|---|
| $\beta < 45^o$ | 5.2 | I3 |
| $\beta > 45^o$ | 4.I | 28 |

TABLE 2

| | ΔU | σ | ΔB | σ | ΔV | σ | N |
|---|---|---|---|---|---|---|---|
| A | 0.057 | 0.007 | 0.035 | 0.005 | 0.032 | 0.003 | 3I |
| B | 0.046 | 0.009 | 0.035 | 0.0I2 | 0.035 | 0.0I0 | I8 |

2. We investigated the dependence of B and $\langle B_e \rangle$ apon phase P on the basis of the mentioned 70 stars and 200 values of $\langle B_e \rangle$ calculated from our own measurements on the 6-m telescope and the literature data. The periods P are taken from the Didelon cataloque. It turned out that both B and $\langle B_e \rangle$ increase up to $P=8^d$ and then having passed the maximum they decrease. Thus we confirm the reverse correlation of the field with the angle speed discovered by Borra and Landstreet, but we found the existence of maximum and the right correlation $B_e \propto \Omega$ for the stars with $P > 8^d$. The existence of such a complicated dependence contradicts to the fossil hypothesis and supports the dynamo model. However, to explain the reverse correlation we support the idea of the influence of the meridional circulation which decreases the surface field for the rapid rotating stars.

3. In 1981 Fleck [3] has shown that the slow rotation of CP-stars can occur due to the interaction of the star magnetosphere with the interstellar matter. In this case the breaking will be proportional to surface fiel $B_s$. But on the other hand it must depend on the orientation of dipole relative to the axis of rotation. If $\beta \cong 0$ the breaking must be minimal, and if $\beta \approx 90°$ the breaking is significant. To test this assumption we have found the mean rotational period for 13 stars with $\beta < 45°$ and for

https://doi.org/10.1017/S0252921100091168 Published online by Cambridge University Press

28 stars with $\beta > 45°$. The mean period for stars of the first group $\bar{P} = 5.2$ and for those of the second one P = $4^d.1$. So it is clear that either the Fleck's theory is wrong or the breaking absent. ( see Table 1 ).

4. With the purpose of finding other effects connecting with the rotating we conducted a comparative analysis of the amplitude variability $\Delta U$, $\Delta B$, $\Delta V$ of two stellar groups with $P < 2$ days ( 30 stars ) and 10 days $< P < 100$ days ( 18 stars ). These data are shown in the Table 2. We see that there are differences only between the parameters U, but within the limit $3\sigma$. If we consider that the photometric variability appears as a result of inhomogenous distribution of chemical elements on the surface, we can draw a conclusion that the rotation does not influence on the concentration degree of chemical elements. The obtained data give a new base for theoretical investigations of stellar magnetism and phenomena connected with it.

## REFERENCES

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https://doi.org/10.1017/S0252921100091168 Published online by Cambridge University Press