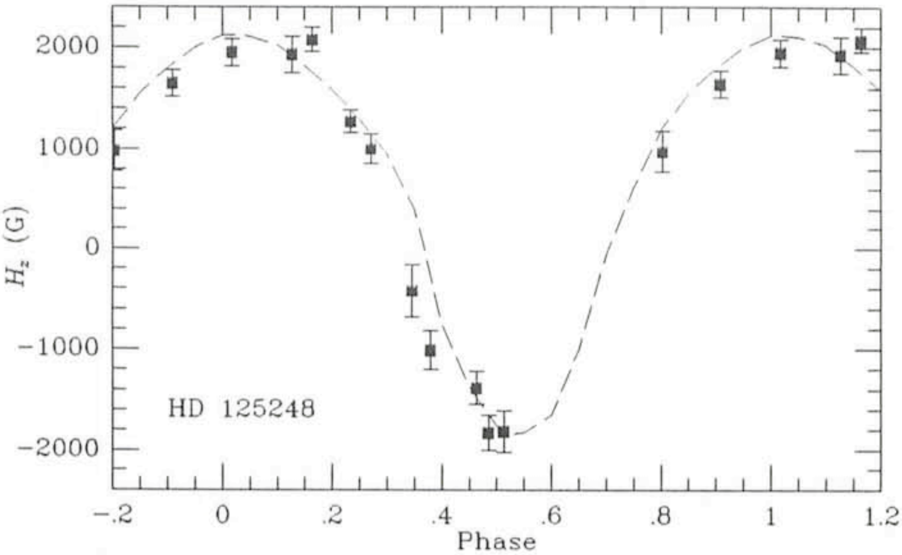

Figure 3: *Comparison of my measurements* (filled squares with error bars) *of the mean longitudinal magnetic field of HD 125248 with the curve of magnetic variation of this star* (dashed curve) *as obtained by Babcock (1960). The abscissa is the rotation phase (see Mathys and Stenflo, 1988, for more details).*

where as an example my measurements of the magnetic field of the A star HD 125248 are plotted together with the curve of magnetic variation for this star that was obtained by Babcock (1960).

The mean longitudinal magnetic field of the four BS observed in this programme is given in Table 3. It was obtained from the measurement of the shift between right and left circularly polarized spectra of the wavelength of FeI lines. The number of such lines used in each case is given in Col. 3 of the table. This number is smaller for stars rotating faster, because only unblended, sufficiently well defined lines can be measured for the present purpose. The values of the field H_z that are given in Col. 2 of Table 3 were obtained by carrying out a linear regression of the measured wavelength shifts $\lambda_R-\lambda_L$ for the lines of the sample, as a function of their respective $\bar{g}\lambda_0^2$. The quoted uncertainties affecting the derived values of H_z correspond to the rms deviation of the $\lambda_R-\lambda_L$ measurements about this regression. They are quite consistent with the random measurement errors in $\lambda_R-\lambda_L$ that are expected from the consideration of the S/N of the spectra and of the depth and width of the measured lines. It can be seen that no large-scale organized magnetic field was detected in any of the four observed BS. This does not mean that none of these stars, taken individually, can have a field like those of the Ap stars. Indeed, as already mentioned, the mean longitudinal field of the Ap stars varies with the rotation period of the star. It cannot be excluded that, observing a star of this type only once, one could unluckily spot a phase where H_z is close to zero, while it becomes much larger at other phases (see the case of HD 125248 in Figure 3, around phases 0.25 and 0.75). However, it would be very unlikely, if all four observed BS had Ap-like magnetic fields, that all of them could have been observed at such an unfavourable phase. Hence it can be inferred that BS in old open clusters do not in general possess large-scale organized magnetic fields similar to those of the Ap stars with strengths in excess of a few hundred gauss.

TABLE 3. *Mean longitudinal magnetic fields*

Star	H_z (G)	Number of lines
F 131	257 ± 206	19
F 153	− 261 ± 236	20
F 185	− 51 ± 272	14
F 238	748 ± 700	6

In conclusion, large-scale organized, strong magnetic fields do not appear to be responsible for the BS phenomenon in old open clusters, or at least all BS in such clusters cannot be explained by the presence of such fields. This, of course, does not rule out the interpretation that BS are quasi-homogeneously evolved stars, since mixing of the stellar interior can be achieved independently of the presence of a large-scale organized magnetic field. This latter point will be tackled through the determination of the C, N, O abundances in the BS of M 67, which is currently in progress. It should finally be mentioned that the programme that has partly been reported in this paper participates in a broader project aiming at setting constraints on the stellar evolution theory through the consideration of the changes in surface abundances of the C, N, O elements along stellar lifetimes.

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Dr. Bo Reipurth
European Southern Observatory/La Silla
Karl-Schwarzschild-Str. 2
D-8046 Garching bei München, Fed. Rep. of Germany.