

Exploring the origin of magnetic fields in massive stars: II.~New magnetic field measurements in cluster and field stars.

S.~Hubrig¹,
M.~Sch²oller²,
I.~Ilyin¹,
N.~V.~Kharchenko³,
L.~M.~Oskinova⁴,
J.~F.~Gonz'alez⁵,
N.~Langer⁶,
A.~F.~Kholtygin⁷, and
the MAGORI collaboration

- 1 - Leibniz-Institut f^ur Astrophysik Potsdam (AIP), An der Sternwarte~16, 14482~Potsdam, Germany;
- 2 - European Southern Observatory, Karl-Schwarzschild-Str.~2, 85748~Garching, Germany;
- 3 - Main Astronomical Observatory, 27~Academica Zabolotnogo Str., 03680~Kiev, Ukraine;
- 4 - Universit^at Potsdam, Institut f^ur Physik und Astronomie, 14476~Potsdam, Germany;
- 5 - Instituto de Ciencias Astronomicas, de la Tierra, y del Espacio (ICATE), 5400~San~Juan, Argentina;
- 6 - Argelander-Institut f^ur Astronomie, Universit^at Bonn, Auf dem H^ugel~71, 53121~Bonn, Germany;
- 7 - Astronomical Institute, Saint-Petersburg State University, Saint-Petersburg, Russia

Theories on the origin of magnetic fields in massive stars remain poorly developed, because the properties of their magnetic field as function of stellar parameters could not yet be investigated. Additional observations are of utmost importance to constrain the conditions that are conducive to magnetic fields and to determine first trends about their occurrence rate and field strength distribution.

To investigate whether magnetic fields in massive stars are ubiquitous or appear only in stars with a specific spectral classification, certain ages, or in a special environment, we acquired 67 new spectropolarimetric observations for 30 massive stars. Among the observed sample, roughly one third of the stars are probable members of star clusters at different ages, whereas the remaining stars are field stars not known to belong to any cluster or association.

Spectropolarimetric observations were obtained during four different nights using the low-resolution spectropolarimetric mode of FORS,2 (FOcal Reducer low dispersion Spectrograph) mounted on the 8-m Antu telescope of the VLT. Furthermore, we present a number of follow-up observations carried out with the high-resolution spectropolarimeters SOFIN mounted at the Nordic Optical Telescope (NOT) and HARPS mounted at the ESO 3.6m between 2008 and 2011. To assess the membership in open clusters and associations, we used astrometric catalogues with the highest quality kinematic and photometric data currently available.

The presence of a magnetic field is confirmed in nine stars previously observed with FORS,1/2: HD,36879, HD,47839, CPD\$-28,2561, CPD\$-47,2963, HD,93843, HD,148937, HD,149757, HD,328856, and HD,164794. New magnetic field detections at a significance level of at least 3σ were achieved in five stars: HD,92206c, HD,93521, HD,93632, CPD\$-46,8221, and HD,157857. Among the stars with a detected magnetic field, five stars belong to open clusters at high membership probability. According to previous kinematic studies, five magnetic O-type stars in our sample are candidate runaway stars.

Reference: A&A, accepted

Status: Manuscript has been accepted

Weblink: <http://arxiv.org/abs/1301.4376>

Comments:

Email: mschoell@eso.org