

# Searches for the new magnetic intermediate-mass stars on various stages of MS evolution

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**Abstract.** A limited list of new results of the searches for the new magnetic stars among late B and early A stars is in this work. Continual observations with spectroscopic devices of the 6m Russian telescope BTA led to successful detection of about 10 new magnetic stars that occupy different parts of evolutionary tracks for the stars of 2–3 solar masses. Measurements of the longitudinal magnetic field show weak and medium strength magnetic field in all program stars.

**Keywords.** star, magnetic field, spectropolarimetry

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## 1. Introduction

The study of stellar magnetism goes on during more than 60 last years, and now more than 450 magnetic Ap/Bp stars are known. Only few dozens of them ever became the objects of detailed study. Better understanding of an evolution of stellar magnetic fields require the extension of the list of known mCP.

The current work is pointed to detection of new magnetic stars among poorly studied B8–A3 stars. By their physical properties these stars are considered as an intermediate class of magnetic stars that occur on different stages of MS evolution.

Below the results of longitudinal field measurements are presented. Most of stars were discovered as magnetic for the first time within the current work during the last 3 years.

## 2. Observations. Data reduction

Spectral material for our work was collected with the Main Stellar Spectrograph (MSS) installed in the Nasmyth-2 focus of the Russian 6m telescope BTA. This spectrograph equipped with the differential circular polarization analyzer and allows to observe the stars up to 11-12 magnitude in spectropolarimetric mode. Long-slit spectra have a mean resolution of  $0.12 \text{ \AA pix}^{-1}$ .

The raw data were reduced with a set of programs mentioned by Kudryavtsev *et al.* (2006). The same set is capable to make the measurements of longitudinal magnetic field by fitting a gaussian function to spectral lines profile. Additionally, using a custom implementation of method, described by Bagnulo *et al.* (2002) we control the positional magnetic measurements. In order to check the right polarity of magnetic field and take probable instrumental polarization into account we observed every night one or two standard stars with well-measured magnetic field along with cool zero-field star.

### 3. The results

#### 3.1. HD 50341

This star was selected for observation due to its photometric IR excess typical for the young stars. Despite of the low accuracy of measurements, caused by the fast rotation, six individual measurements allow us to make the conservative conclusion about magnetic nature of HD 50341. Further study of this star will consider also the detailed analysis of hi-res spectra.

#### 3.2. HD 63347

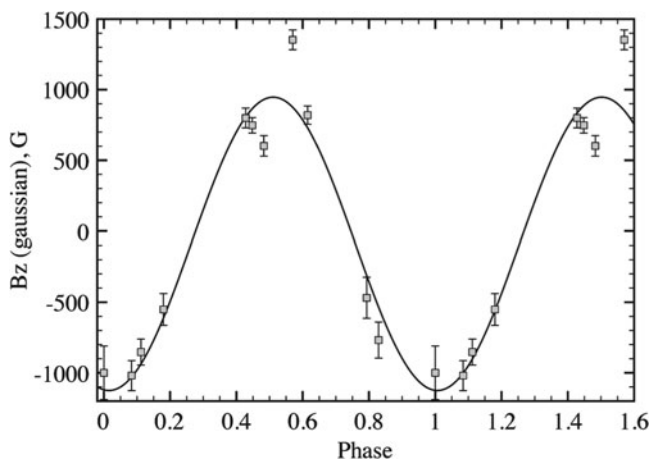
HD 63347 was selected for observation due to its IR excess. Additional indication of its young age was found in Tetzlaff *et al.* (2011). On the figure our measurements of  $B_z$  phased with period 1.74984 days (Koen, Eyer 2002). Detailed study of echelle spectra, obtained with BTA, confirm SrCrEu abundance anomalies that together with young age make this star unique.

#### 3.3. HD 96003

Bright star ( $V = 6^m.06$ ) was characterised as SrCr by Renson & Manfroid (2009). Seven measurements of polarized, rich on the lines, spectra demonstrate approximately constant (about  $-150$ – $-180$  G) value of  $B_z$ . HD 96003 is a binary system with angular separation of about  $2''$  between components. An individual measurement of each component should be attractive and may have a high importance for the understanding of stellar magnetic field evolution.

#### 3.4. HD 201174

In the current list HD 201174 is the only one early known magnetic star. The first measurements of its longitudinal field were made in SAO RAS by D. Kudryavtsev. Strong cross-over effect and sharp spectral lines allow us to make a detailed study of physical properties of the star. Location of HD 201174 on the HR diagram is typical for young stars. Rotational period is still unknown but 16 individual measurements of  $B_z$  imply relatively short value of  $P_{rot}$ .



**Figure 1.** Periodic variability of longitudinal magnetic field of HD 63347.

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