

## First results of the magnetic field measurements on the G0 IV $\eta$ Boo

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**Abstract.** Search for a magnetic field on  $\eta$  Boo has been performed over 50 nights in 1999 – 2014. Statistically significant magnetic field has been detected over 5 out of 50 nights. The total range of the longitudinal magnetic field variations is from  $-15.1 \pm 6.4$  G to  $23.1 \pm 9.6$  G.

**Key words:** stars: activity – stars: late-type – stars: magnetic fields – stars: individual:  $\eta$  Boo

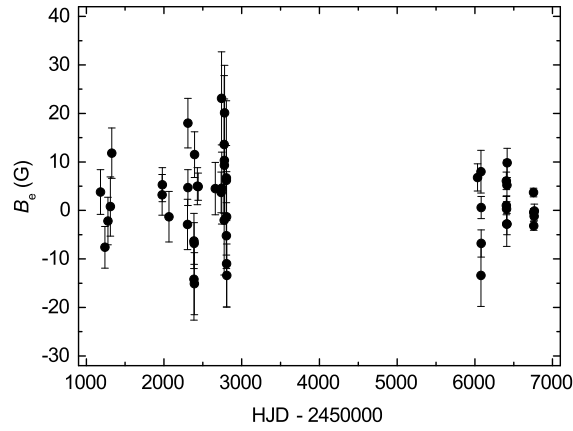
### 1. Introduction

$\eta$  Boo (HD 121370, HR 5235, Sp G0IV) is a yellow subgiant with a thin convective envelope containing less than 1% of the total mass of the star (van Belle *et al.*, 2007). Carrier *et al.* (2005) have obtained  $T_{\text{eff}} = 6030 \pm 90$  K,  $M/M_{\odot} = 1.57 \pm 0.07$ , and the age  $t = 2.67 \pm 0.10$  Gyr for this star.  $\log g = 3.817 \pm 0.016$  and  $R/R_{\odot} = 2.672 \pm 0.028$  have been reported by van Belle *et al.* (2007). The  $S$ -index  $0.144 \pm 0.005$  has been estimated by Hempelmann *et al.* (2016). We present the preliminary result of our study of the magnetic field on  $\eta$  Boo.

### 2. Results

Spectropolarimetric observations of  $\eta$  Boo have been performed over 50 nights from 1999 to 2014 with the 2.6-m Shajn telescope at the Crimean Astrophysical Observatory using the long-slit spectrograph (45 nights in 1999 – 2013, spectral resolution  $R \sim 30000$ , spectral range 6200 – 6270 Å) and echelle spectrograph (5 nights in 2014, spectral resolution  $R \sim 57000$ , spectral range 5200 – 6420 Å). The calculation of the longitudinal magnetic field (LMF) has been performed with the procedure discussed by Butkovskaya & Plachinda (2007).

Figure 1 shows the LMF,  $B_e$ , of  $\eta$  Boo measured from 1999 to 2014. The total range of LMF variations is from  $-15.1 \pm 6.4$  G to  $23.1 \pm 9.6$  G. We have detected a statistically significant magnetic field over 5 out of 50 dates (see Table 1). Most of the  $B_e$  values are in the range from about  $-5$  to  $10$  G, whereas the average error is  $\sim 5$  G. Thus, if the magnetic field of  $\eta$  Boo has large-scale and small-scale components as, for example, the magnetic field of  $\beta$  Aql (Butkovskaya



**Figure 1.** Longitudinal magnetic field of  $\eta$  Boo in 1999 – 2014.

**Table 1.** Statistically significant magnetic field  $B_e$  of  $\eta$  Boo.

HJD	$B_e$	$\sigma$	$B_e/\sigma$
2452307.540	18.0	5.1	3.5
2456405.478	6.1	1.8	3.4
2456415.318	9.8	3.0	3.3
2456756.440	3.7	0.9	4.1
2456757.486	-3.2	0.9	3.6

et al., 2017), long-term and more precise measurements are needed to identify both of these components.

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