The magnetic variability of the star HD 14437

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Abstract. The magnetic field of the CP star HD 14437 was discovered by Glagolevskij et al. (1985) using the 6-m telescope of the Special Astrophysical Observatory. No polarity changes have been found during 2 years of observations. A very long (> 3–4 years) period of rotation was proposed to explain the measurements. To check this hypothesis, we made a new series of magnetic field observations for this star 10 years later with the 6-m telescope. The polarity of the longitudinal magnetic field is still negative and has not shown any change during more than 10 years of observations. We found the most probable periods to be several days. It means that we have observed a star where the magnetic and rotation axes are inclined at a small angle, and the negative pole is not far from the line of sight.

Key words: Stars: chemically peculiar – Magnetic fields – Zeeman effect

1. Observations and data reduction

HD 14437 is a poorly studied peculiar A–star with a magnitude of 7.4, effective temperature \( T_{\text{eff}} = 10800 \) (Glagolevskij, 1995). Observations of the 1980s with the 6-m telescope showed a variability of the longitudinal magnetic field with an amplitude of about 2 kG and a constant negative sign. The description of the observations and data reductions are presented by Glagolevskij et al. (1985) in more details.

In this paper we present new observations of HD 14437 which were carried out in 1996–97 using the CCD detector (Chuntonov & Glagolevskij, 1997). We have observed the spectra of the star on the 6-m telescope with a spectral resolution \( R = 30000 \). The context NICE (Knyazev & Shergin, 1995) in the MIDAS system was used. The new and old observational data are presented in Table 1 (JD 2444655–2445900: with photographic plates, JD 2449555 and JD 2449556: with the hydrogen lines magnetometer, from JD 2450000 on: with the CCD detector).

We have carried out the line identification using the Vienna Astrophysical Line Data–Base (VALD) (Piskunov et al., 1995) and Moore’s tables (Moore, 1945). In view of determining the individual Landé factor of each spectral line used in our measurements, we have identified the lines in the following spectral ranges: \( \lambda 5955–6385 \) and \( \lambda 4460–4680 \). Si and Cr are observed to be overabundant.
We have found an underabundance of O by the lack of the lines OI $\lambda$6155.97, 6556.78 and 6158.18 which are usually strong at spectral class A2.

We have determined the effective magnetic field using Babcock’s standard formula with the individual Landé factor $z$ for each line. The measurements are given in Table 1.

The effective magnetic field has preserved its sign for about ten years. The suggestion about the long period of the star contradicts our data, because we have observed the longitudinal component of the magnetic field to undergo significant changes within a few days only. So, we can draw the conclusion that the axis of rotation, the magnetic axis and the line of sight are inclined at small angles.

### Table 1. The observations of the effective magnetic field.

| JD 2400000 | $B_e \pm \sigma$ G | JD 2400000 | $B_e \pm \sigma$ G |
|------------|-----------------|------------|-----------------|
| 44655.208  | $-1620 \pm 170$ | 50415.240  | $-1940 \pm 180$ |
| 44656.308  | $-1030 \pm 170$ | 50415.269  | $-2570 \pm 180$ |
| 44659.188  | $-440 \pm 170$  | 50499.196  | $-2650 \pm 260$ |
| 44660.196  | $-800 \pm 140$  | 50499.221  | $-2600 \pm 160$ |
| 44860.541  | $-2280 \pm 110$ | 50500.161  | $-2460 \pm 220$ |
| 45303.354  | $-1230 \pm 120$ | 50500.188  | $-2050 \pm 250$ |
| 45303.362  | $-1020 \pm 110$ | 50617.507  | $-2570 \pm 260$ |
| 45476.541  | $-2080 \pm 280$ | 50643.521  | $-1360 \pm 110$ |
| 45900.493  | $-2040 \pm 130$ | 50705.451  | $-1330 \pm 210$ |
| 49555.472  | $-1340 \pm 380^*$| 50706.410  | $-960 \pm 110$  |
| 49556.420  | $-1710 \pm 460^*$| 50707.412  | $-830 \pm 100$  |
| 50413.523  | $-2040 \pm 300$ | 50709.602  | $-1370 \pm 110$ |
| 50414.125  | $-2310 \pm 280$ | 50710.432  | $-2110 \pm 120$ |
| 50415.217  | $-2460 \pm 270$ |            |                 |

* — observations with the magnetometer
The magnetic variability of the star HD14437 remains quite acceptable. Besides, determination of the period by photometry, with a much larger number of homogeneous points, undoubtedly gives a more reliable result. The $B_e$ phase diagram for $P = 26^d.732$ is presented in Figure 1.

![Figure 1](image_url)

**Figure 1.** Variation of the effective magnetic field $B_e$ for $P = 26^d.732$.

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