THE mCP STAR HD 9996 - PRECESSION OR NOT?

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ABSTRACT. The star HD9996 have a long-period magnetic field of variations. On long-term variability was impose shorter variations conterminous with the orbital period.

Key words: Stars: magnetic field; stars: individual: HD9996.

1. Long-period magnetic phase curve.

Compilation of early photometric measurements for HD9996 allowed to constrain the corresponding period P in range $7750 < P_{ph} < 8550$ dayes, Pyper & Adelman, (1986). Period from magnetic measurements $P_{mag} = 7842$, Bychkov et al.,(1997), $P_{mag} = 7692$, Bychkov et al.,(2005). Since the magnetic phase curve still was poorly constrained, monitoring project for HD9996 was continued until now. Because this object is a realitively bright, magnetic monitoring were done in coude-focus of 1-m reflector SAO, equipped with CEGS spectrometer and analyzer of circuliar polarization (Bychkov, 2008). Finally we collected 41 measurements of B_e during 15 recent years. Fig.1 shows long-period magnetic phase curve. All data for 60 years of supervision have been used. We have found the best magnetic period $P_{mag} = 8019.24$. The magnetic curve has a double wave with parameters $B_0 = -429G$, $B_1 = 1330G$, $B_2 = 332G$. The wide scatter of B_e specifies possible availability to short time variability.

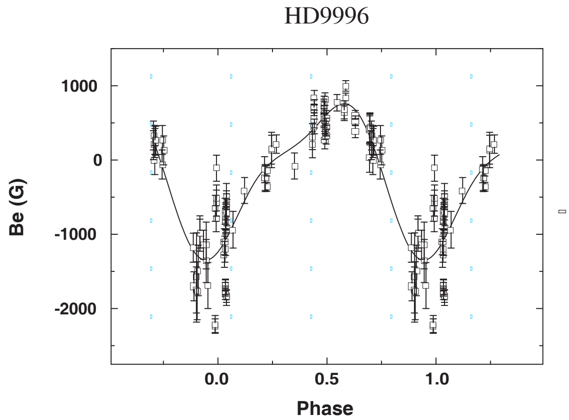

Figure 1: Long-period magnetic phase curve.

2. Short-term magnetic variability.

We used only B_e received by us for search of the short period. We measured $V_e sinI$ on all spectra and have received $\leq 8km/s$. The star has radius nearly 2.4 solar radius - the period should be more than 15.2 days. We have found using evasion from the average curve short magnetic period. It has coincided with the orbital period $P_{orb} = 272.99$ days (Scholz, 1978). On Fig.2 shows variability with imposing this period. Fig.3 shows a phase curve of this variability with

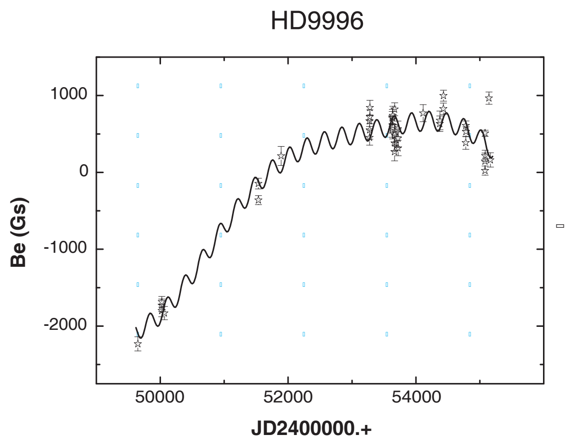

Figure 2: Magnetic behaviour HD9996 for last 15 years of our observation.

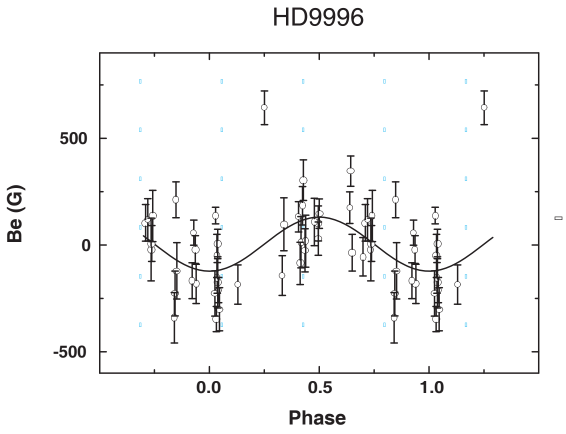

Figure 3: Short-period magnetic phase curve.

parameters $B_0 = 4$, $B_1 = 128G$ about the long-term magnetic mean phase curve.

3. Discussion.

We tried to explain magnetic behaviour precession axes rotations of the main star in double system with the period of 8020 days as well as Lehmann (1987), the period of rotation of a star is synchronized with the orbital period and makes 272.99 days, angle $\beta = 18$ degrees, Eulers angle $\Theta = 43$ degrees. We took structure of a magnetic field of the main component as the central not displaced dipole described standard formalism of Preston (1967).

This assumption is contradicted by following data:

1. The amplitude should be maximal at short variability in a phase when mean $B_e = 0$ (the axis of rotation lays in a plane of the sky) and minimal when mean $B_e = max$ (the angle i is minimal).

2. Slow precession variability should be strictly harmonious, not have a double wave.

4. Our plans for the future.

We plan to continue regular magnetic monitoring of this object.

1. We wish to study its magnetic behaviour in more detail.
2. Modulation of a magnetic field with the orbital period is very interesting. Probably it not only tidal effects. Probably it is interoperability of magnetic fields if the second component the magnetic white dwarf.
3. We wish to understand, the rotation of the main component with the orbital period is synchronized or not.

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