THE VARIABILITY OF GLOBAL MAGNETIC FIELDS OF STARS. THE NEW OBSERVATIONS DATA

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Research on the variability of magnetic field of stars allows one to understand many aspects of the nature of this phenomenon. Variability of global magnetic field was found practically in all types of stars, beginning from hot supermassive $Of?p$ stars to few cold low-mass red dwarfs (Bychkov et al. 2013). Currently the fossil theory is very popular (Braithwaite & Nordlund, 2006) and is seen in hot young stars (MiMeS collaboration). Formation of the global field is a long process, it takes time close to age of a star (not less than 10^4 years). But now there are new observational data which show, that there are mechanisms which can change magnetic status of a star much faster, in time scale 1-2 years. Ae/Be star HD190073 is the example of such a change. This star has changed the magnetic behaviour in the very short interval of time. Dependence of B_e on JD for HD190073 is shown in Fig.1 (Alecian et al. 2013). Certainly such a change in the behaviour of the longitudinal magnetic field cannot be explained by the fossil theory. Possibly convection "has included" the dynamo mechanism. Then, the generation of the global magnetic field can proceed in so short time period (leading to the configuration of inclined rotator).

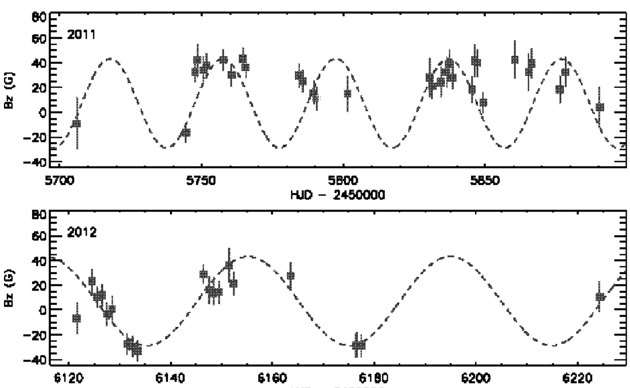

Figure 1: Measured longitudinal magnetic fields B_e vs. JD for HD190073.

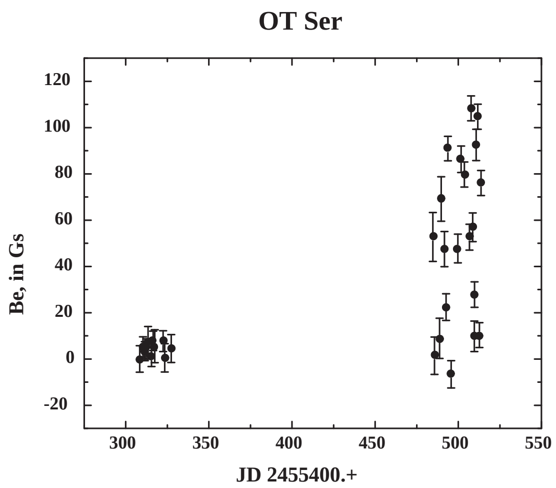

Figure 2: Measured longitudinal magnetic fields B_e vs. JD for OT Ser.

Rapid change of the magnetic status was observed in cold red dwarf OT Ser (Donati et al. 2008). Run of B_e vs. JD for OT Ser is shown in Fig.2. It is seen that the magnetic behaviour considerably changed during half a year - in the time interval between both sets of observations. Fig.3 shows the magnetic phase curve for OT Ser with the period of rotation $3^d.424$ obtained from B_e measurements of the second set.

OT Ser belongs to the class of flare stars, which are very interesting objects. These stars lose energy of rotation in flashes following the scheme: rotation - differential rotation - generation of local magnetic fields - flares (dissipation of local magnetic fields). The energy loss is dominated by radiative processes. There occurs "slight" braking. It is now clear, that sometimes (possibly seldom) local magnetic fields do not dissipate, but can built up to form the global magnetic field. It is only the most tentative assumption. Real mechanism maybe is much more complex. In stars with the global magnetic field development of flares will occur

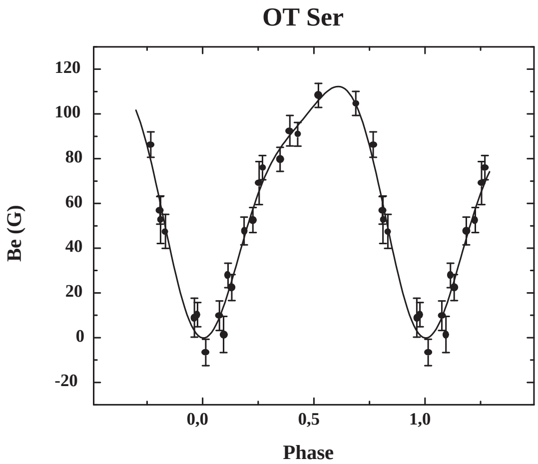

Figure 3: Magnetic rotational phase curve for the cold red dwarf OT Ser for the rotational period $3^d.424$.

in the presence of that field which will undoubtedly affect movement of matter. In any event it is necessary to reconsider the standard models of flashes, cf. Hawley et al. (1995); Katsova et al. (1999); Katsova and Livshits (2001); Shibata and Yokoyama (1999, 2002); Stepanov et al. (2005).

New observational data require review of some of the settled concepts on the mechanisms of occurrence and evolution of global magnetic fields.

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