Magnetic Fields throughout Stellar Evolution
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The large scale magnetic field of the G0 dwarf HD 206860 (HN Peg)

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Abstract. HD 206860 is a young planet (HN Peg b) hosting star of spectral type G0V and it has a potential debris disk around it. In this work we measure the longitudinal magnetic field of HD 206860 using spectropolarimetric data and we measure the chromospheric activity using Ca II H&K, H-alpha and Ca II infrared triplet lines.

1. Introduction

It is widely accepted that stellar activity is directly related to the magnetic field, which in turn is related to the underlying dynamo. Our understanding of the dynamo can greatly benefit from the surface magnetic activity measurements. HD 206860 is a young solar type star of spectral type G0V which makes it an ideal candidate for spectropolarimetric observations.

2. Observations and Data Analysis

We use data collected as part of the BCOOL project by the NARVAL spectropolarimeter at the TBL at Observatoire Pic du Midi,France. We have six epochs of observations from 2007 to 2012. HD 206860 is a young (0.2 Gyr) solar analouge and we carry out direct magnetic field measurements and chromospheric activity measurement

2.1. *Activity indicators*

To measure the S-index (Baliunas *et al.* (1985)) we use two triangular bandpasses at H and K lines and two bandpasses R and V at 400.107 and 390.107 nm respectively. We use a rectangular bandpass at the Hα line and two bandpasses at 655.885 and 656.730 nm respectively(Morgenthaler *et al.* (2012)) to measure the Hα-index variability. To calculate the CaIRT-index we use rectangular bandpasses at the line cores of the Ca IRT lines and we take two bandpasses at 870.49 nm and 847.58 nm. The variability of the three indices is shown in Fig. 1(*Top*).

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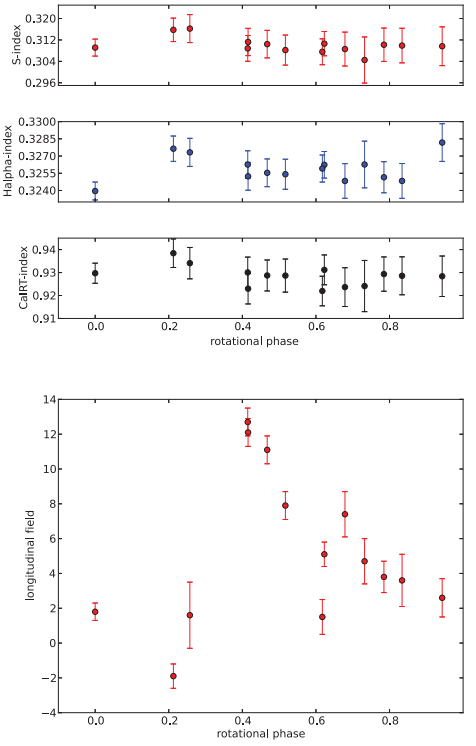

Figure 1. *Top:* The variation of different activity indicators as a function of rotational phase for 2012.*Bottom:* The variation of the longitudinal magnetic field as a function of the rotational phase for 2012.

2.2. *Longitudinal magnetic field*

The longitudinal magnetic field of HN Peg is measured from Stokes V data. The (signal-to-noise) SN in the raw spectra is not high enoguh to obtain the Zeeman signature for individual spectral lines. Hence we apply LSD Donati *et al.* (1997) technique to the lines to boost the SN. The variation of the magnetic field is seen in Fig. 1(*Bottom*).

3. Summary

We carry out magnetic field measurements for the G0 dwarf HN Peg. The chromospheric activity measurements indicate the presence of a variable magnetic field which is supported by the longitudinal magnetic field measurements. The initial results show HN Peg is an active young star with a variable magnetic field.

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