In this contribution we present the preliminary results of the study of the magnetic field of the system BD+20 1790 and its close-in giant planet.

Previous results show a high level of stellar activity, with the presence of prominence-like structures, spots on the surface and strong flare events, despite the moderate rotational velocity of the star.

The presence of the planet could be an interpretation for these, in terms of stellar-planet interactions (SPI) theory.

To study the stellar activity we have carried out both echelle spectroscopic and photometric monitoring over the past few years.

Strong chromospheric activity was detected in several observing runs (Hernán-Obispo 2005, 2007, 2010). All these activity indicators are in emission above continuum, from Ca II H & K to Ca II IRT lines. The wide wavelength range of the spectrums from the near UV to the infrared allowed us to study the structure of the chromosphere by using lines which carry information on different atmospheric levels, from the region of $T_{\text{eff}}$ to upper chromosphere.

The emission flux in active stars usually shows a periodic modulation which is most likely caused by rotational modulation of plage-like structures. We investigate the variation of these activity indicators to search for plage-like structures such as sunspots, mainly in Ca II K.

To avoid the photospheric contribution to the spectral profiles, we applied the spectral subtraction technique (Montes et al. 1995). No modulation were observed, although it could be hidden by the flares, which affect significantly the Hα emission.

Due to the high level of chromospheric activity detected, a high photospheric activity was expected. The photospheric observations yielded a light curve with evidence of rotational modulation, the semi-amplitude of which approaches $\Delta V \sim 0.03$ and indicates the presence of spots on the surface.

The period analysis of the entire set of observations reveals a photometric period of 2.8 days.

The amplitude of each band is consistent with large spot or spot group covering at least 4% of the surface.

ASAS (All Sky Automated Survey) observations were carried out during 2002-2009 years, obtained in $V$ band. Sample light curve folded to rotational period is shown on Fig. 5.

Quasi-invariance over seven years shows that spots could be regenerated at about the same longitude.

Stellar magnetic activity may be influenced by the presence of a close-in giant planet, as proposed by Catalán et al. (2005). In the form of enhanced stellar activity of the star’s outer atmosphere. Thus the planetary companion, reported by Hernán-Obispo et al. (2010a), a massive close-in planet, could explain the high level of stellar activity detected.

Also, the large flares with energy releases in the superflare regime and the high rate of flare activity in planet, could explain the presence of spots on the surface.

The mere presence of the planet and its magnetic field embedded in the corona may affect stellar wind formation and coronal densities. In a recent paper, Lincoln (2000) proposes a new model that predicts the formation of prominence-like structures in very highly active stars with close-in giant planets.

Modelling such features can allow us to obtain information on the magnetic field of the planet as well as the spectra of the host star, which is currently in preparation.

Further details soon in Hernán-Obispo et al. 2010c (in preparation)