

Extensive spectroscopic and photometric study of HD 25558, a long orbital-period binary with two SPB components

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Abstract. We carried out an extensive photometric and spectroscopic investigation of the SPB binary, HD 25558 (see Fig. 1 for the time and geographic distribution of the observations). The ~ 2000 spectra obtained at 13 observatories during 5 observing seasons, the ground-based multi-colour light curves and the photometric data from the *MOST* satellite revealed that this object is a double-lined spectroscopic binary with a very long orbital period of about 9 years. We determined the physical parameters of the components, and have found that both lie within the SPB instability strip. Accordingly, both components show line-profile variations consistent with stellar pulsations. Altogether, 11 independent frequencies and one harmonic frequency were identified in the data. The observational data do not allow the inference of a reliable orbital solution, thus, disentangling cannot be performed on the spectra. Since the lines of the two components are never completely separated, the analysis is very complicated. Nevertheless, pixel-by-pixel variability analysis of the cross-correlated line profiles was successful, and we were able to attribute all the frequencies to the primary or secondary component. Spectroscopic and photometric mode-identification was also performed for several of these frequencies of both binary components. The spectroscopic mode-identification results suggest that the inclination

and rotation of the two components are rather different. While the primary is a slow rotator with ~ 6 d rotation period, seen at $\sim 60^\circ$ inclination, the secondary rotates fast with ~ 1.2 d rotation period, and is seen at $\sim 20^\circ$ inclination. Our spectropolarimetric measurements revealed that the secondary component has a magnetic field with at least a few hundred Gauss strength, while no magnetic field was detected in the primary.

The detailed analysis and results of this study will be published elsewhere.

Keywords. line: profiles, stars: binaries: general, stars: oscillations (including pulsations), stars: rotation, stars: variables: other

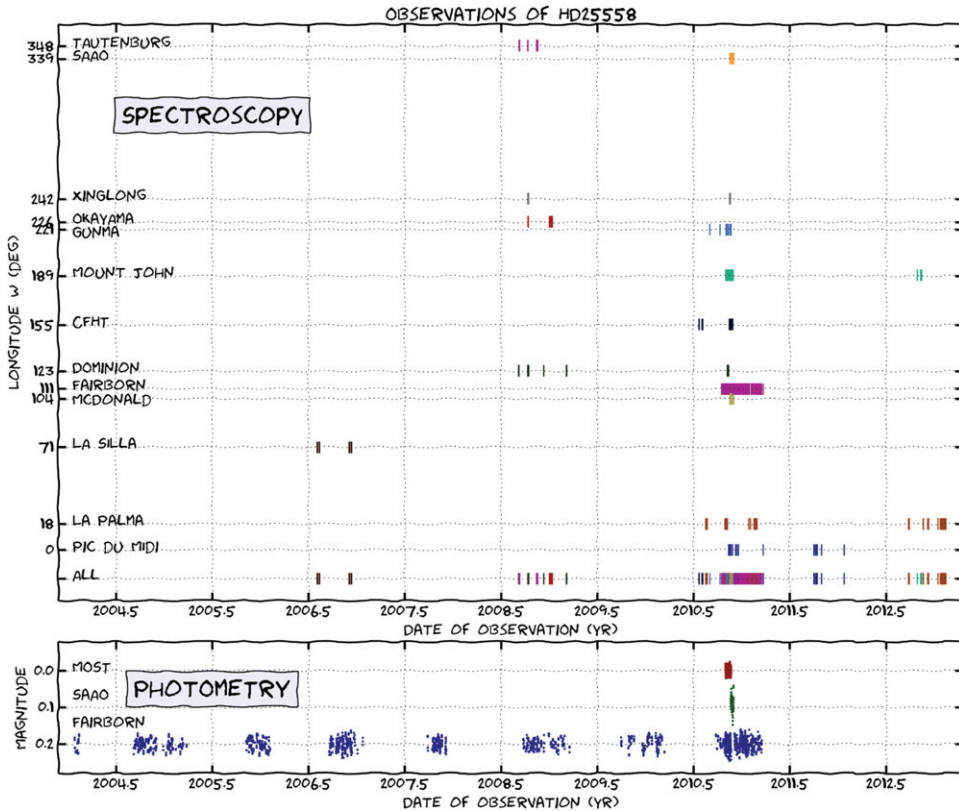


Figure 1. Time and geographic distribution of the spectroscopic and photometric observations of HD 25558. The main campaign was organised in the 2010/11 season.

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