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MOST OBSERVATIONS OF THE λ BOOTIS STAR HD 142703

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For the first time, we present photometric data of a space mission (MOST satellite) for a member, HD 142703 (HR Lib, V = 6.12), of the λ Bootis group. The latter comprises late B- to early F-type, Population I stars which are generally metal weak and show underbundances as particularly the iron group elements, but not in C, N, O and S. Only a maximum of about 2% of all objects in the relevant spectral domain are believed to be λ Bootis type stars (Paunzen 2001).

At least 70% of all λ Bootis type stars inside the classical instability strip pulsate with rather typical δ Scuti type characteristics (Paunzen et al., 2002).

In the past, three different IBVS notes reported ground-based observations for this object. A summary is given in Paunzen & Handler (1996) who list detected frequencies of 16.5, 18 and 31.5 d^{-1}. The highest of these published frequencies, however, was probable due to a misidentification or alias in the periodogram and is two times the "true" one. The amplitudes were found to be between 8 and 10 mmag for Strömgren v and b, respectively.

The MOST observations were carried out from May 18 to 28, 2007. HD 142703 was observed as a switch target, this means: MOST switches between two targets every orbit (101.4 min). One target benefits from the low stray light phase, while the light curve of the other target suffers from high stray light. In our case HD 142703 was observed in the latter phase. As for the published ground-based observations, HD 142640, was used as a comparison star. The reduction and all instrumental corrections were done in the standard way for this instrument and the given settings (Rowe et al., 2006). The final light curve is shown in Fig. 1.

The time series analysis was performed within the CINDERELLA (Comparison of INDEpendent RELative Least-squares Amplitudes) programme package (Reegen et al., 2008) which is optimized for these data sets. In addition, a Fourier technique and the Phase-Dispersion-Minimization was applied.

All methods yield comparable results. Two frequencies of 16.99 and 18.35 d^{-1} are detected, with a high significance (12 and 8σ), in the light curve. Both compare well, within the errors, to the previously reported ones. The phase diagram of the observations folded with the main frequency is shown in Fig. 2. Furthermore, no significant frequencies, which do not correspond to known artefacts due to the experimental design, can be detected. The limited of the detectable amplitude for the data set is about 0.8 mmag.

The amplitudes of the MOST data are a factor two smaller than the previously reported ones. This result can be understand due to the fact that MOST measures the integrated light from 350 to 700 nm, only.

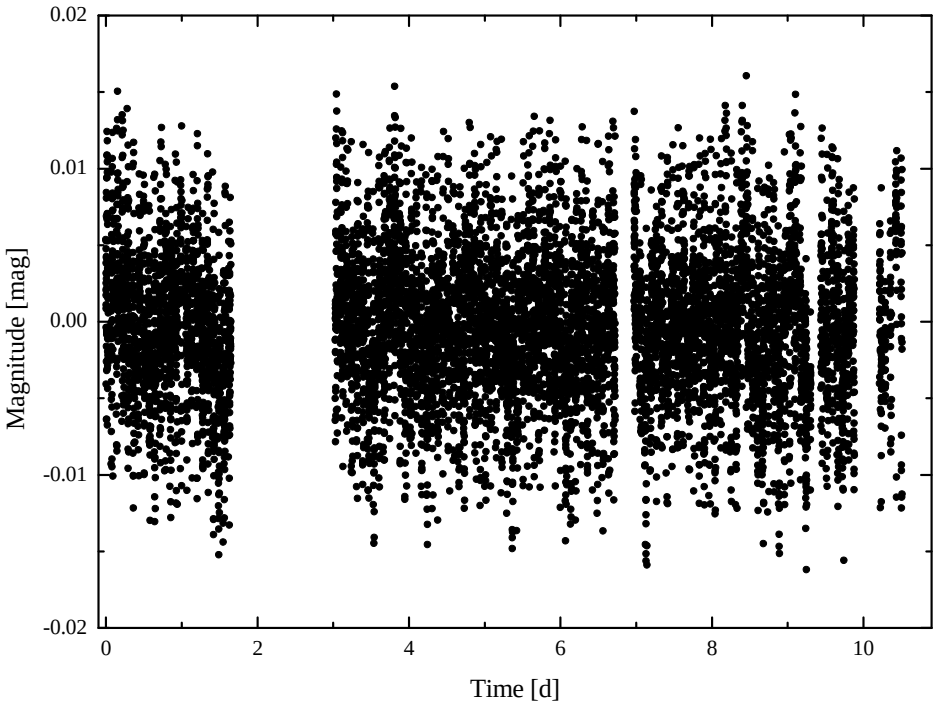

Figure 1. The MOST observations of HD 142703.

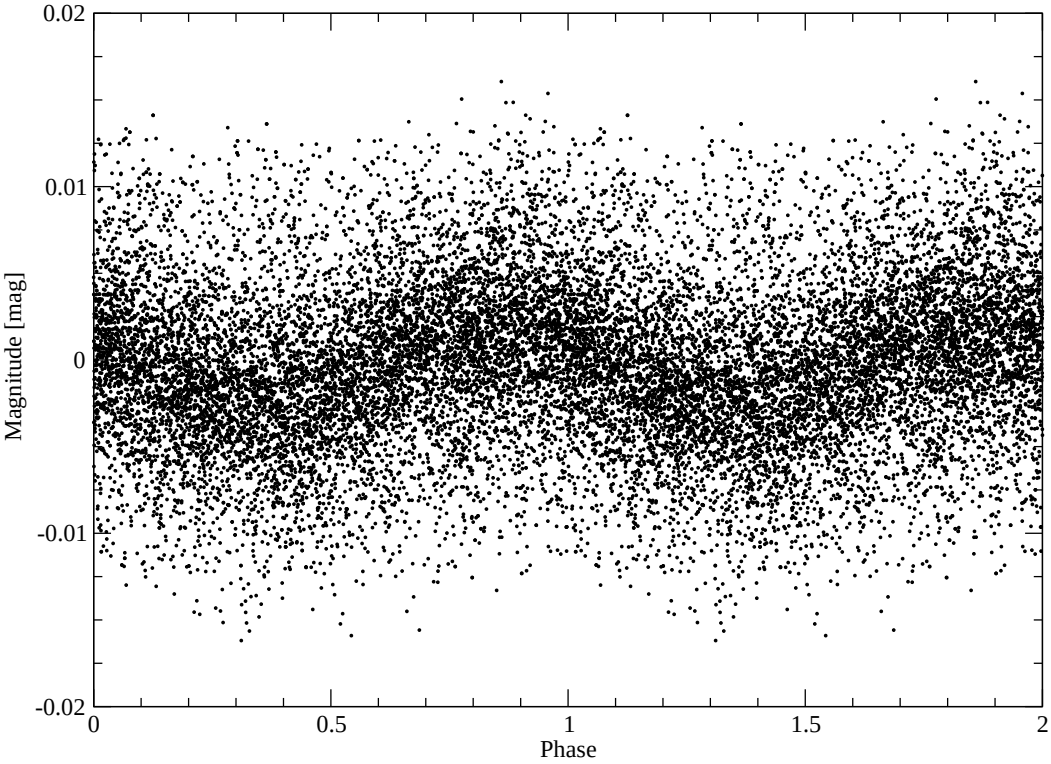

Figure 2. The MOST observations of HD 142703 folded with the main frequency.

Taking the basic astrophysical parameters of HD 142703 from Paunzen et al. (2002), we get Q values of 0.024 and 0.022, as well as $\log \rho/\rho_{\odot} = -0.80$, respectively. These values correspond to the second to fourth overtone for classical δ Scuti type pulsation (Fitch, 1981).

We conclude that for HD 142702, two frequencies are well established. The pulsation characteristics seems very similar to another member of the λ Bootis group, HD 210111 (Breger et al., 2006). In both cases, there is one domination frequency, but all others only have very small amplitudes.

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