

HD 102541: A PULSATING CANDIDATE λ BOOTIS STAR

The candidate λ Bootis star HD 102541 was observed during five nights with the “modular photometer” at the 0.5m telescope (observer: R. Kuschnig), operated by the South African Astronomical Observatory (SAAO). The characteristics of these nonmagnetic, metal-deficient Population I, A- to F-type dwarfs are described in more detail by Paunzen et al. (1997). The journal of observations and the chosen comparison stars are listed in Table 1. The light curve shown in Fig. 1 reveals the photometric variability of the program star with respect to both comparison stars. The applied standard time series analysis (Wei 1990) to the high quality data results in the amplitude spectrum and spectral window shown in Figure 2. The highest signal (6σ detection) appears at the frequency of 20 d^{-1} ($232 \mu\text{Hz}$) which refers to a period of 72 min and the peak to peak amplitude is about 30 mmag in Strömgen v . These values are typical compared to previous results obtained by our survey for pulsating λ Bootis stars (Paunzen & Handler 1996).

In order to establish the membership of HD 102541 to the λ Bootis group, an intermediate resolution spectrum ($0.9 \text{ \AA}/\text{pixel}$) was obtained in the night of 13./14.06.95 (observer: E. Paunzen) with the Cassegrain spectrograph of the 1.6m telescope at Itajuba, Brazil.

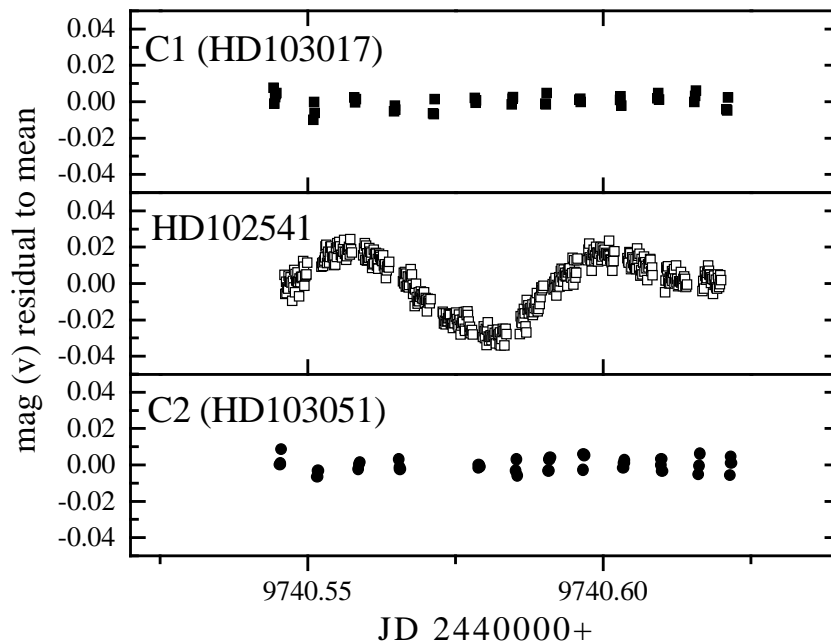


Figure 1. Light curve of HD 102541 and both comparison stars for the first night in Strömgen v

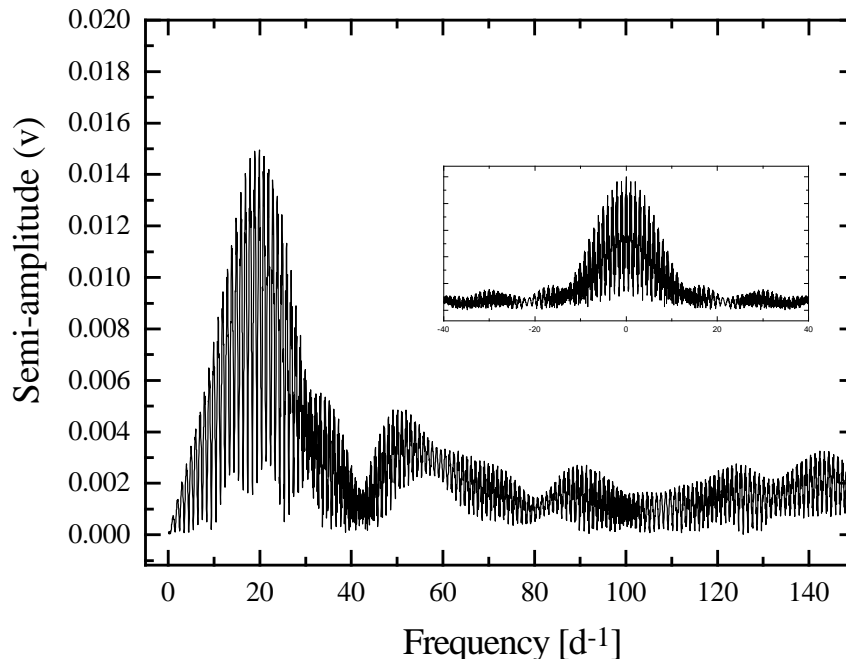


Figure 2. Amplitude spectrum and spectral window for the merged differential data of all five nights [HD 102541 – HD 103017] in Strömgren v

Table 1. Journal of observations for the program and comparison stars

Star	Durchm.	JD	hours	m_V	Spec.
HD 102541	CD -39° 7307	2449740	2	8.0	(λ Boo)
		2449741	2.5		
		2449742	1.5		
		2449744	2		
		2449747	1		
HD 103017	CD -39° 7339			7.7	F3IV/V
HD 103051	CD -40° 6992			7.4	F5V

Houk (1978) classified HD 102541 as A3 II/III. The Strömgren colours ($b-y=0.163$, $m_1=0.141$, $c_1=0.810$, $\beta=2.798$; Gray & Olsen 1991), on the other hand, indicate that this star is actually a metal-deficient dwarf. Using the calibrations of Crawford (1979) and Napiwotzki et al. (1993), we derive $T_{eff}=7700(200)$ K, $\log g=4.1(2)$ (typical for luminosity class V), $\delta m_0=0.053(10)$ and $M_{Bol}=2.5(3)$. The discrepancy between the luminosity classification given in the Michigan catalogue and a reclassification with higher resolution spectra, is a common fact for λ Bootis stars (Gray 1991). We classify HD 102541, based on the spectrum showed in Figure 3, as $kA3hA5mA3V$ (LB), please note that the MgII 4481-line is normal for A3 and not remarkably weak.

Many similarities of HD 102541 to the pulsating ($P_{obs}=84$ min) λ Bootis star HD 168947 are obvious (Paunzen et al., 1994). This star was also classified as A3II/III, but turned out to be a metal-deficient dwarf. Both stars are almost at the same place in the H-R diagram resulting in a comparable pulsation behaviour (observed period and amplitude). The observed period for HD 102541 is very close to the theoretical radial fundamental mode ($P_{th}=67$ min) derived by the PLC-relation taken from Stellingwerf (1979) making this star to an interesting target for an international multisite campaign.

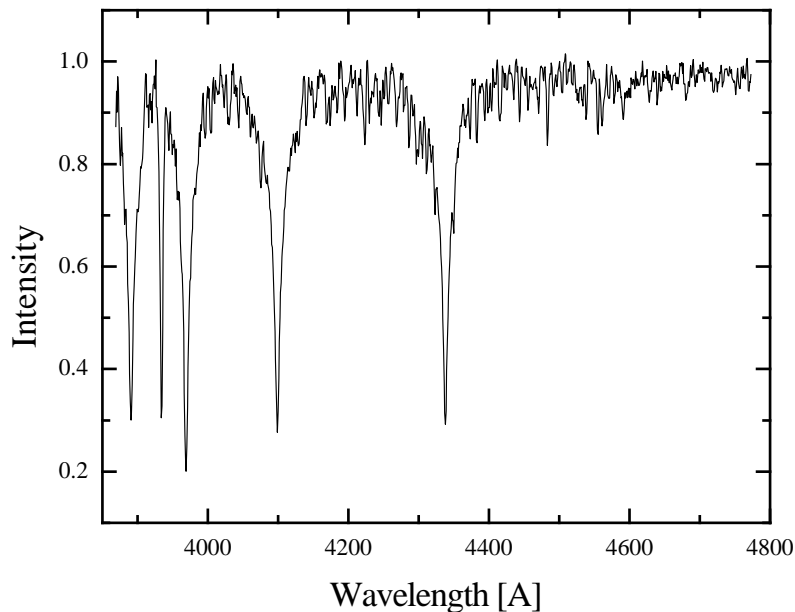


Figure 3. Intermediate resolution ($0.9 \text{ \AA}/\text{pixel}$) spectrum of HD 102541

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