

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 3986

Konkoly Observatory
Budapest
14 February 1994
HU ISSN 0324 - 0676

DETECTION OF VARIABILITY IN THE
 λ Boo STAR HD 142703

The λ Bootis stars are a group of apparently metal poor population I, early A-type stars. They are characterized by a CaIIK line which is too weak in respect to the otherwise classical A type and luminosity class V spectrum. HD 142703 ($m_V=6.1$, HR 5930, BD-14° 4314) was classified by Gray and Corbally as kA1hF0mA1 Va λ Boo, 1993. Astrophysical parameters derived from Geneva-photometry (Kobi & North 1990) are:

$$\log g = 3.85, T_{\text{eff}} = 7208 \text{ K}, [M/H] = -1.99$$

and from the Strömgen-photometry (Moon & Dworetzky 1985):

$$\log g = 3.88, T_{\text{eff}} = 7180 \text{ K}, \delta m_0 = 0.07$$

Observations were done as part of a survey for pulsation among λ Boo type stars at ESO, La Silla, in June/July 1993. The single channel photometer at the 50 cm ESO telescope was used with Strömgen b and v filters. Two nights of differential photometry were obtained with an integration time of 10 seconds. HD 142640 (C1, $m_V=6.4$, HR 5927, BD-13° 4290, F6V) was used as a comparison star during both nights, and HD 143333 (C2, $m_V=5.5$, HR 5954, F7V) in addition during the first night.

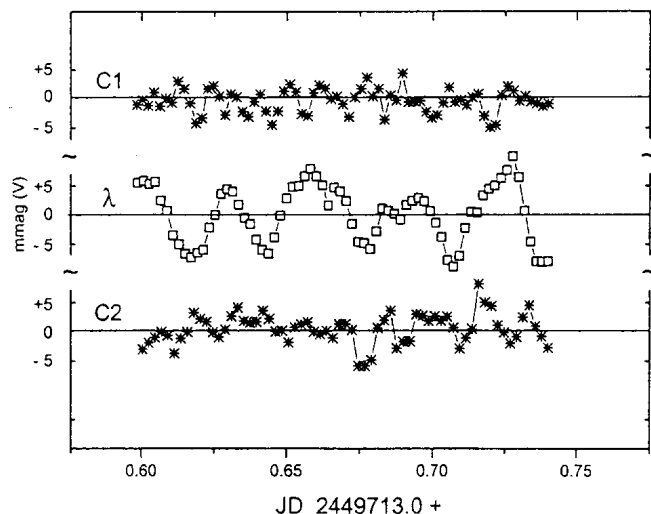


Figure 1: Instrumental Strömgen v data for HD 142703 and both comparison stars

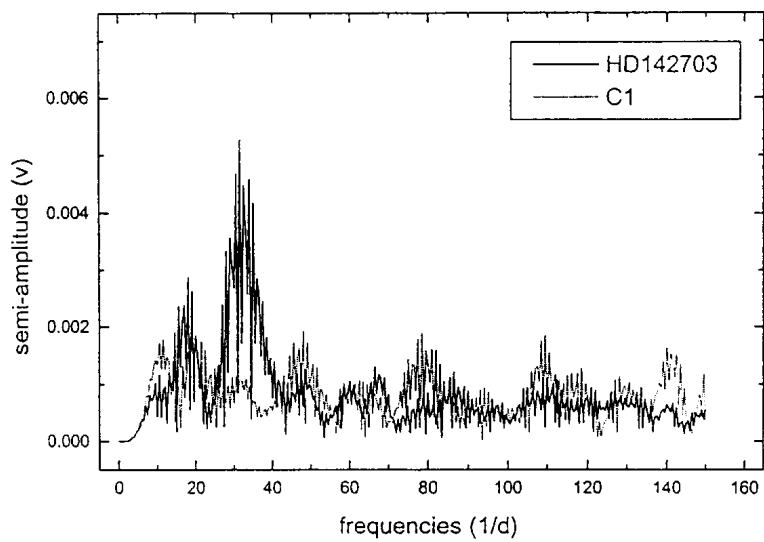


Figure 2: Amplitude spectra (v) for HD 142703 and the comparison star C1

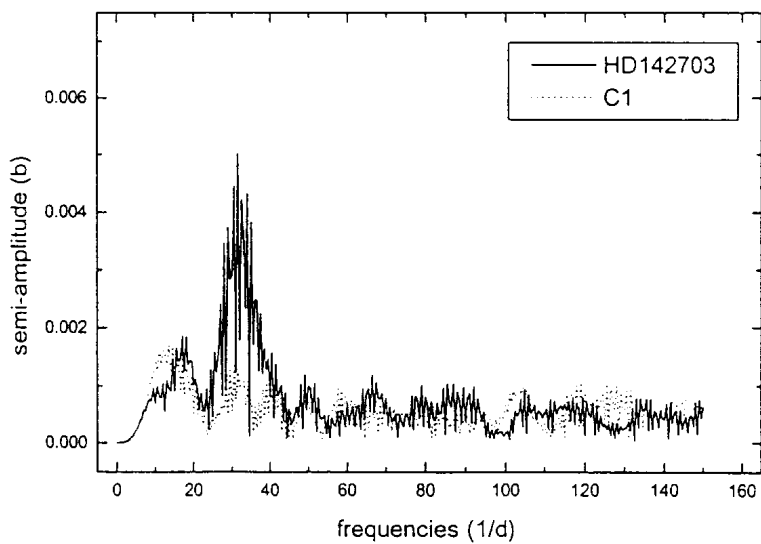


Figure 3: Amplitude spectra (b) for HD 142703 and the comparison star C1

The averaged intensities of the comparison stars provided us with a synthetic 'super'-comparison star data set which was smoothed in such a way that atmospheric drifts with periods larger than one hour were removed. Figure 1 shows the differential photometry for the λ Boo star and both comparison stars in instrumental Strömgen v , obtained during the first night (JD 2449173) and relative to the synthetic comparison star. The light curve for our program star has a smaller scatter, because it was observed at least twice as frequently as the comparison stars and two consecutive observations were averaged.

In both nights and for both colors we find a peak in the amplitude spectrum for HD 142703 at the same frequency. The evidence for variability of the λ Boo star and the constancy of the comparison stars (in the frequency domain of interest for this investigation) is corroborated by the amplitude spectrum of the entire data sets of two nights (fig. 2 and 3).

Nevertheless, a dedicated observing campaign which includes at least one other observatory at a different longitude is needed to firmly establish the variability of HD 142703 and to determine the frequencies involved.

A least squares sine-fit to the combined data of both nights results in an amplitude of 10.6 mmag for v and 10.0 mmag for b , with a frequency of 31.5 d^{-1} (46 min).

HD 142703 increases the sample of probably pulsating λ Boo candidate stars to eight (Weiss, Paunzen, Kuschnig, Schneider, 1994). This star is the second λ Boo star after HD 142994 for which we have discovered evidence for pulsation as a result of our photometric λ Boo survey and may be an analogon in period and amplitude to the pulsating λ Boo star HD 192640 (Weiss et al. 1994).

It is important to discover pulsation among λ Boo stars, because pulsation allows to derive stellar structure parameters by applying the tools of asteroseismology. This aspect is particularly interesting for λ Boo stars, because their location in the HR-diagram, and hence their evolutionary status, still is controversial.

Ernst PAUNZEN
 Werner W. WEISS
 Institut für Astronomie
 Türkenschanzstr. 17
 1180 Wien
 Austria
 e-mail: ernst@tycho.ast.univie.ac.at

References:

- Gray R.O., Corbally C.J., 1993, AJ 106, 632
 Kobi D., North P., 1990, A&A Suppl. Ser. 85, 999
 Moon, T. T., Dworetzky, M. M. 1985, MNRAS 217, 305
 Weiss W.W., Paunzen E., Kuschnig R., Schneider H., 1994, A&A, 281, 797