

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

Number 4348

Konkoly Observatory  
Budapest  
23 May 1996

*HU ISSN 0374 – 0676*

**DISCOVERY OF 30-MIN OSCILLATIONS IN THE Ap Sr(EuCr) STAR  
HD 75425**

Using the Strömgren photometry of Martinez (1993) as a guide, we have been searching for rapidly oscillating Ap (roAp) stars in the southern hemisphere. The roAp stars are cool, magnetic, chemically peculiar A-type stars (typically classified as Ap SrCrEu) that pulsate with periods in the range 6–16 minutes and Johnson *B* semi-amplitudes  $\leq 0.008$  mag. There are currently 28 accepted members in the class (Martinez 1993). This Bulletin announces the discovery of 30-minute oscillations in the candidate roAp star HD 75425. Although this star is indisputably variable, it is not clear that it is a roAp star, as we discuss below.

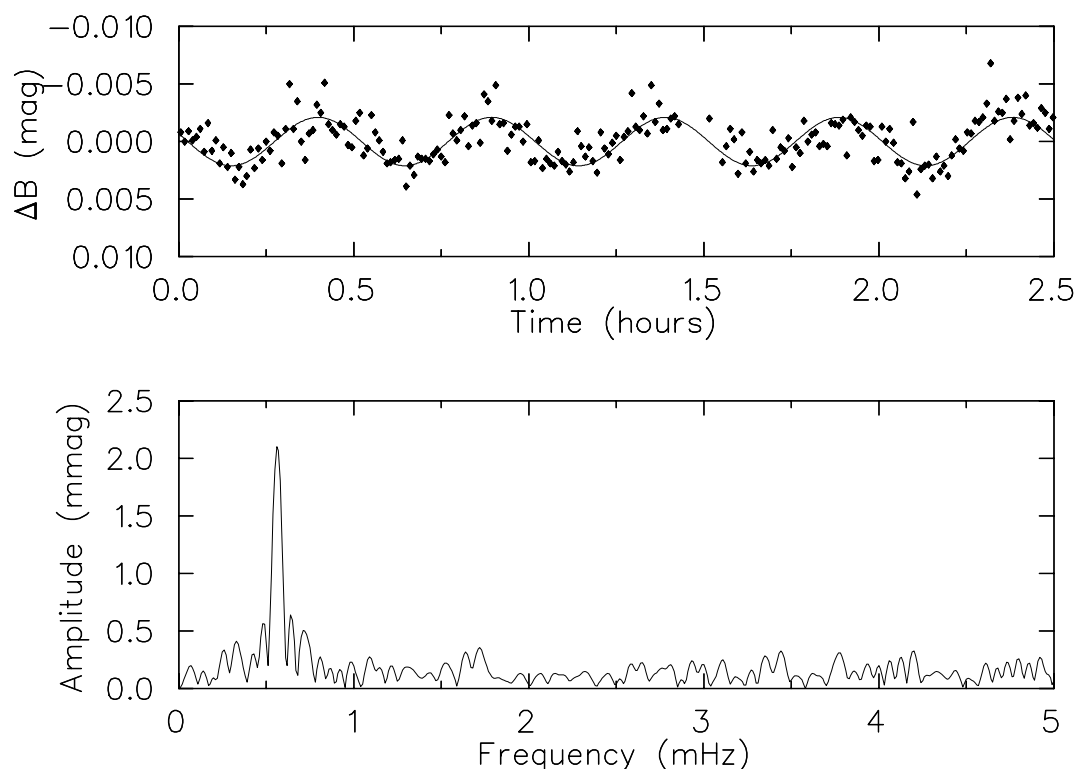


Figure 1

HD 75425 is classified as Ap Sr(EuCr) by Houk (1978), who remarks “weak case; undetected visual double,  $P=288^\circ$ ,  $D=0''.4$ , mags 9.9, 10.0.” Martinez (1993) measured the Strömgren indices to be  $V=9.584$ ,  $b-y=0.112$ ,  $m_1=0.247$ ,  $c_1=0.805$  and  $\beta=2.864$ . The calculated dereddened metallicity and luminosity indices are  $[\delta m_1] = -0.064$  and  $[\delta c_1] = -0.116$ , which indicate strong metallicity and heavy line blocking in the Strömgren  $v$  band, characteristics which we associate with roAp stars.

On the night of 18/19 March 1996 (JD 2450161) we observed HD 75425 for 4.92 hr using the Radcliffe People’s Photometer attached to the 1.0-m telescope of the South African Astronomical Observatory in Sutherland. The data were acquired as continuous 10-s integrations in Johnson  $B$  light. A half-hour oscillation was evident at the telescope, as confirmed by subsequent analysis of the light curve. The data were corrected for coincidence counting losses, sky background and extinction. Some low-frequency ( $\nu \leq 347 \mu\text{Hz}$ ) sky transparency variations were then removed and the data were binned to 40-s integrations. Figure 1 shows a  $2\frac{1}{2}$ -hour portion of this light curve and the discrete Fourier transform of the full light curve. The tallest peak in the Fourier transform is at  $560 \mu\text{Hz}$  ( $P=29.8$  min) and has an amplitude of 2.10 mmag. These oscillations have been confirmed by subsequent observations acquired using the Modular Photometer attached to the SAAO’s 0.5-m telescope. Comparison of the available light curves for this star indicates that the amplitude is modulated. This may be caused by rotation and/or by beating of two or more independent pulsation frequencies.

The interpretation of the oscillations in HD 75425 is not straightforward. A period of 30 min is rather long for a roAp star, but also rather short for a  $\delta$  Sct star. It would be interesting to demonstrate the existence of  $\delta$  Sct-type oscillations in an Ap star, but it is not clear that Houk’s Ap Sr(EuCr) classification is correct. The  $m_1$  index suggests a high metallicity indicative of Ap stars. Given the  $0''.4$  separation and the apparent brightness of this double the possibility that this system comprises a chemically normal star and a magnetic, chemically peculiar star cannot be excluded. Since the stars comprising this double have such a small magnitude difference, both stars are probably inside the instability strip, making it difficult to establish which is the variable.

I acknowledge a fruitful discussion with Don Kurtz and thank him for his helpful comments.

PETER MARTINEZ

Department of Astronomy

University of Cape Town

Rondebosch 7700

South Africa

email: peter@uctvms.uct.ac.za

## References:

- Martinez, P., 1993, Ph.D. Dissertation, University of Cape Town.  
Houk, N., 1978, *Michigan Spectral Catalogue of Two-Dimensional Spectral Types for the HD Stars* - Volume 2, Department of Astronomy, University of Michigan, Ann Arbor, Michigan.