COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 3809

Konkoly Observatory
Budapest
20 November 1992

*HU ISSN 0324 - 0676*

# A Detection of Rapid Infrared Oscillations in HR 1217= DO Eri

The rapidly oscillating Ap (roAp) star HR 1217 was observed through a Johnson *K* filter for 2.4 hr on the night 17/18 August 1992 (JD 2448852) with the SAAO 1.9-m Radcliffe telescope and Mk III InSb photometer. The *f*/50 secondary mirror chops between two apertures to measure the quantities *(star + sky1)-sky2* and *sky1-(star + sky2)*. Subtraction of these quantities yields twice the stellar signal minus the sky background contribution. Since we were searching for rapid oscillations with periods around 6 min., no standard stars were observed and we did not attempt to put the observations on the standard system. The resulting instrumental magnitudes were corrected for mean extinction.

Figure 1 is the light curve of these data which shows that there was a gradual improvement in sky transparency during this run. Fig. 2 shows the Fourier transform of those data up to the Nyquist frequency of 6.0 mHz. The peaks at low frequency are caused by sky transparency variations. Normally we would remove these frequencies, but for illustrative purposes we show them in Fig. 2 to convince the reader that we have a credible detection of oscillations at the known optical oscillation frequency even in the presence of the sky transparency variations.

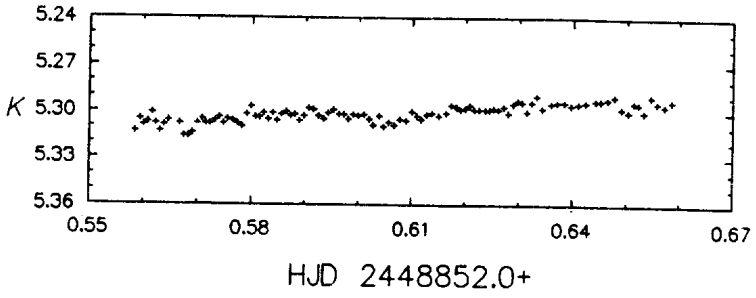


Fig. 1

The peak labeled '$\nu_1$' lies at 2.73 mHz, exactly the frequency of the well-studied *B*-band oscillations (Kurtz *et al.* 1990). Removing the low-frequency noise lowers the general level of the peaks but does not otherwise change the appearance of the spectrum much. When the 4 highest peaks

in the frequency range 0 - 0.92 mHz are removed the highest peak remaining is at 2.72 mHz. A least squares fit of $\nu_1$ = 2.72 mHz to the prewhitened data yields an amplitude of 1.3±0.4 mmag for $\nu_1$.

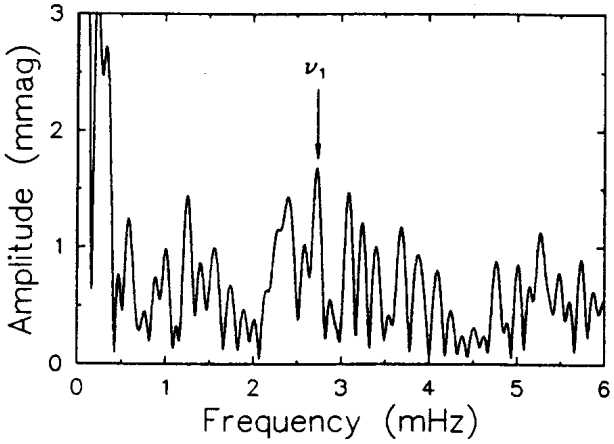


Fig. 2

Without prior knowledge of the optical oscillations at 2.72 mHz, this peak would be statistically insignificant. However, the chance of finding a peak of $z$ signal/noise in power at exactly the right frequency is ~ $e^{-z}$ (Scargle 1982). Taking $A_1$ = 1.3±0.4 mmag and the level of the noise in the amplitude spectrum of the prewhitened data as a conservative 0.8 mmag, $z = (1.3/0.8)^2$ which yields a False Alarm probability of 7% for this peak; *i.e.* the peak $\nu_1$ is significant at the 93% level.

Unfortunately, the beating of the principal oscillation modes in HR 1217 does not allow us to predict the instantaneous $B$ amplitudes on any given night. Thus we cannot compare our tentative measurement of $A_K$ to any expectations of the $K$ amplitude. For this, simultaneous multicolour photometry will be necessary.

**Peter Martinez[1] & K. Sekiguchi[2]**

[1] *Dept. of Astronomy, University of Cape Town, Rondebosch 7700, South Africa*

[2] *S.A. Astronomical Observatory, P.O. Box 9, Observatory 7935, South Africa*

PETER@UCTVAX.UCT.AC.ZA

**References**

Kurtz, D. W. et al., 1989, *Mon. Not. R. astr. Soc.*, **240**, 881
Scargle, J. D., 1982, *Astrophys. J.*, **263**, 835