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DISCOVERY OF RAPID OSCILLATIONS IN HD 12098

MARTINEZ, PETER¹; GIRISH, V.²; JOSHI, S.³; KURTZ, D.W.⁴; ASHOKA, B.N.²;
CHAUBEY, U.S.³; GUPTA, S.K.³; SAGAR, R.³; SEETHA, S.²

¹ South African Astronomical Observatory, P.O. Box 9, Observatory 7935, South Africa,
e-mail: peter@saaao.ac.za

² ISRO Satellite Applications Centre, Airport Rd, Bangalore 560 034, India, email: girishv@isac.ernet.in

³ Uttar Pradesh State Observatory, Manora Peak – 263 129, Naini Tal, India, email: santosh@upso.ernet.in

⁴ Dept of Astronomy, University of Cape Town, Rondebosch 7700, South Africa, email: dkurtz@saaao.ac.za

The rapidly oscillating Ap (roAp) stars are cool, magnetic, chemically peculiar A-type stars that pulsate with periods in the range 6–16 minutes and Johnson *B* semi-amplitudes ≤ 0.008 mag. In 1998 we initiated the *Naini Tal – Cape roAp Star Survey* to find northern roAp stars. Candidates are selected on the basis of an Ap spectral classification and/or peculiar photometric colours. HD 12098 is classified as an F0 star in the HD catalogue, but it has Strömngren indices indicative of strong metallicity found in the Am and Ap stars, *viz.* $b - y = 0.191$, $m_1 = 0.328$, $c_1 = 0.517$ and $\beta = 2.796$ (Hauck & Mermilliod 1998).

On the basis of these peculiar colours we decided to search for rapid oscillations in HD 12098 on night 21/22 November 1999, JD 2451504. Our observations comprised continuous 10-s integrations in Johnson *B* light acquired with the ISRO high-speed photometer attached to the 1.0-m Sampurnanand telescope of the Uttar Pradesh State Observatory in Naini Tal.

We were rewarded with the discovery of 7-minute oscillations. These observations were observed again on nights JD2451505, 51534 and 51535. Fig. 1 shows the light curve obtained on night JD 2451534. The data shown here were corrected for coincidence counting losses, sky background and extinction, and were then binned to 40-s integrations. Finally, some mild sky transparency variations on time scales $\geq 1/2$ hr were prewhitened.

Fig. 2 shows the amplitude spectrum of the light curve depicted in Fig. 1. The amplitude spectrum peaks strongly at 2.19 mHz ($P = 7.61$ min). Fig. 2 also underscores the excellent photometric quality attainable on a good night at Naini Tal – the scintillation noise is ≤ 0.25 mmag in this 2-hr run.

Inspection of the available light curves indicates the presence of amplitude modulation, which may be caused by beating among several frequencies and/or non-radial pulsations being seen from variable aspect as the star rotates. An exploratory single-site study of HD 12098 spanning several weeks will reveal the frequencies responsible for this amplitude modulation. At 2.2 mHz, the oscillations in HD 12098 are well resolved from the sky transparency variations at good photometric sites, so the prospects for detailed studies of the oscillations are quite good.

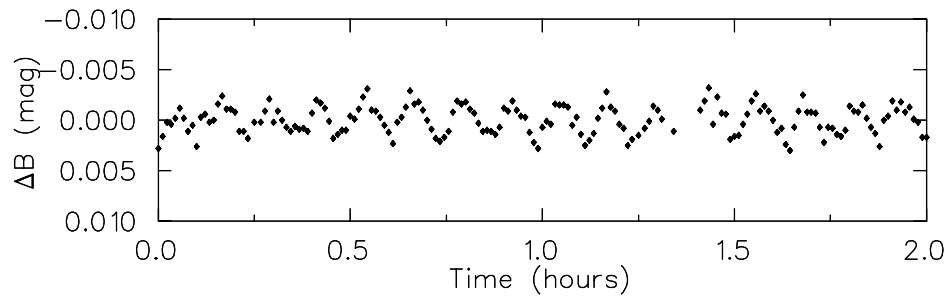


Figure 1.

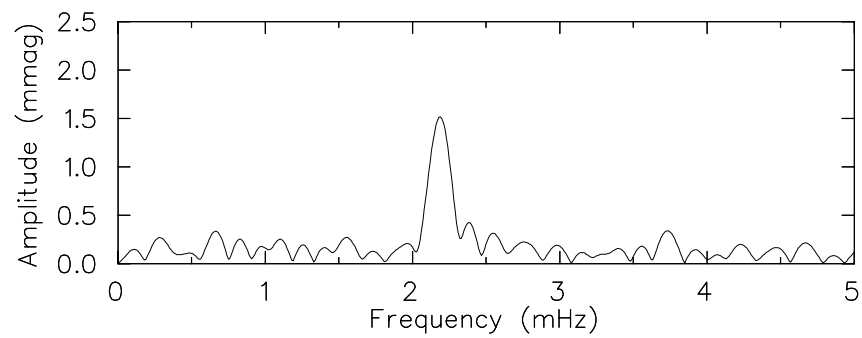


Figure 2.

The discovery of rapid oscillations in HD 12098 is consistent with the high metallicity indicated by the peculiar colours, and implies an Ap (rather than Am) nature for this star.

Reference:

Hauck, B., Mermilliod, M., 1998, *A&AS*, **129**, 431