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THE DISCOVERY OF RAPID OSCILLATIONS IN THE Ap STAR HD161459.

The cool Ap star HD161459 was monitored photometrically for 7.36 hr on the night 16/17 July 1990 (JD2448089), as part of an ongoing program to detect rapid oscillations among the chemically peculiar A stars. The photometry, which consists of a series of continuous 10-s integrations, was obtained with the University of Cape Town photometer attached to the 1.0-m Elizabeth telescope of the South African Astronomical Observatory (SAAO). All the observations were obtained using a Johnson *B* filter and a 30-arcsec diaphragm with occasional interruptions for sky measurements. Because we were searching for oscillations with periods in the range of 4 to 15-minutes, we did not

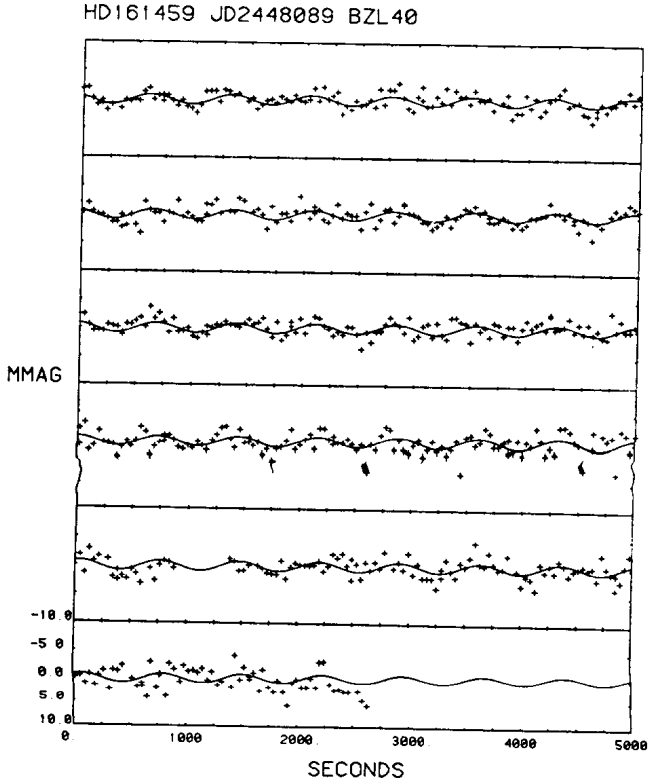

Figure 1

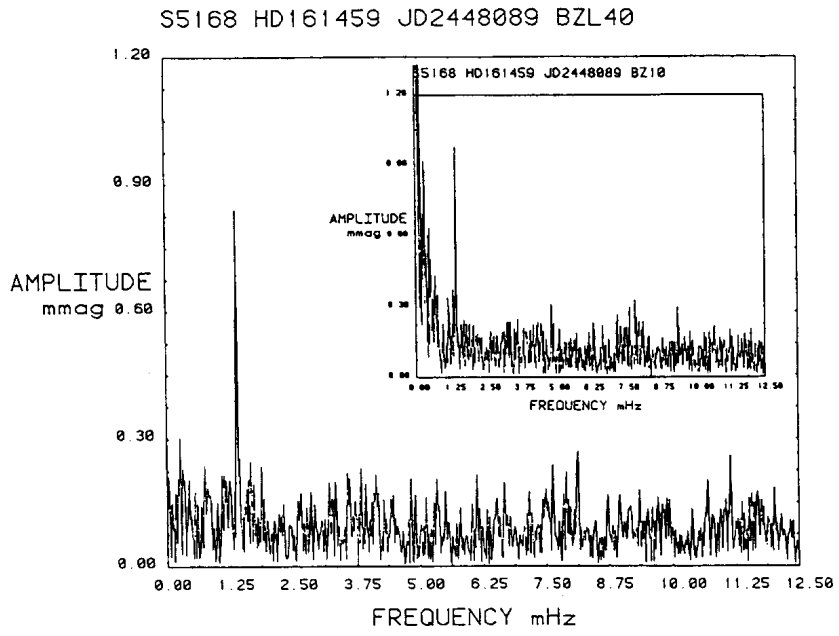

Figure 2

employ a comparison star. However, experience has shown that on good nights it is usually possible to distinguish between slow changes in sky transparency and rapid oscillations in the star. The data were corrected for coincidence counting losses, sky background and mean extinction, in that order. Finally we took non-overlapping four-point averages of the data. We also removed some long-period ($P>0.92$ hr, $\nu<26$ day^{-1}) variations which we attribute to the slow changes in sky transparency mentioned above. Since the periods of such variations are well removed from the periods of interest, their removal does not affect the analysis of these data. The resulting light curve is presented in Fig. 1.

Figure 2 is an amplitude spectrum of the data in Figure 1 out to the Nyquist frequency of 12.5 mHz for 40-s integrations. This amplitude spectrum was computed using Kurtz's (1985) faster implementation of Deeming's (1975) Discrete Fourier Transform algorithm for unequally spaced

data. The prominent peak is at $\nu = 1.39$ mHz ($P = 12.0$ min.) with a semi-amplitude of 0.84 millimagnitudes. The inset in Fig. 2 shows that we have a convincing detection of the rapid oscillations even in the presence of the sky transparency variations. These variations raise the level of the noise dramatically at lower frequencies.

A sinusoid with the frequency $\nu = 1.39$ mHz has been fitted to the data by least squares in order to optimize its amplitude and phase. This sinusoid is shown as the solid curve in Fig 1. The fitted curve is in fairly good agreement with the observations.

The discovery of rapid oscillations in HD161459 brings to 16 the total number of rapidly oscillating Ap stars known (Kurtz 1990, Martinez *et al.* 1990). Further high-speed photometry of this object will be acquired in the near future.

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