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**Optical monitoring of the 60 ms X-ray pulsar candidate
Wackerling 2134**

Observations with the *Einstein Observatory* by Caraveo *et al.* (1989) have led to the identification of the relatively bright variable X-ray point source IE1024.0-5732 with the emission line early-type star Wack 2134 (Wackerling, 1969). Their timing analysis has shown that the X-ray source has a periodicity $P \sim 60$ ms, and optical spectra indicates the star in Wack 2134 is probably of O5 type. Hence Caraveo *et al.* infer indirectly that the Wack 2134 system is a binary, with the hot massive star losing matter to a spinning neutron star. The observed period then would make this system the fastest X-ray pulsar to date.

With this short period in mind, we have examined Wack 2134 for the possible presence of optical pulsations. The system has been observed on three separate occasions in white light, using a photometer sampling at a rate of 1 kHz on the University of Tasmania's 1 m telescope. In each case, the data train was examined using several 2048K point Fast Fourier Transforms. Both single FFT's of the data reduced to 3 ms time resolution, and the average FFT of several overlapped data segments at 1ms were generated. The low frequency end of the single FFT spectrum from the best data run, 105 min of data obtained on 19 December 1989, is shown in Figure 1. The plot in Figure 1 was generated by grouping the power spectrum into blocks of 128 points, and determining the maximum and mean power in each block. Here the maxima are shown in the upper plot while the relatively smoother means are shown underneath. The minima from each of the 128 point blocks lie along the frequency axis. As can be seen in Figure 1, no significant spikes are evident.

To place a 90 percent confidence level upper limit on the amplitude of any modulation, the method described by Lewin *et al.* (1988) has been used. In the frequency range of 10 Hz to 20 Hz, the 19 December 1989 data set an upper limit,

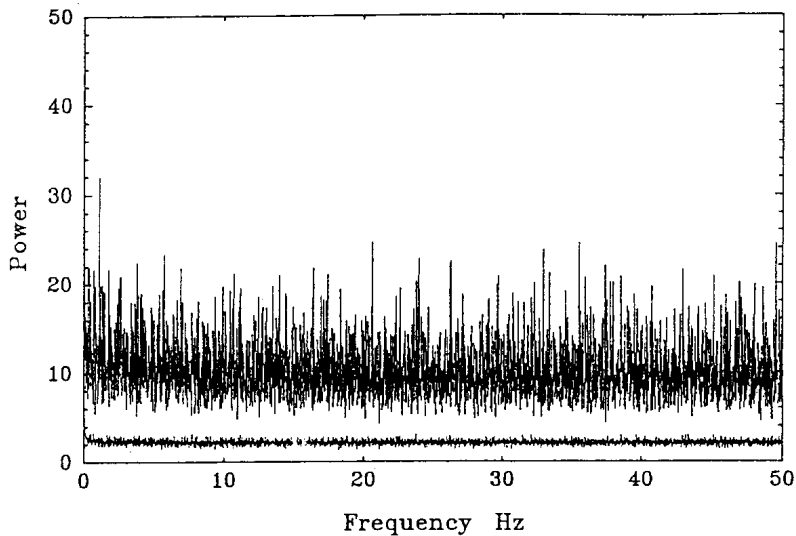


Figure 1: The average FFT power spectrum of Wack 2134 obtained on 19 December 1989, as discussed in the text.

for any pulsed optical component, of ~ 7.1 mag fainter than the white light flux from Wack 2134. Since the apparent visual magnitude of Wack 2134 is ~ 12.6 , this implies an upper limit around magnitude 19.7 for any optical pulsations.

S. W. Dieters, K. M. Hill and R. D. Watson

University of Tasmania
GPO Box 252C
Hobart, Tasmania
Australia, 7001.

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