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XMM-NEWTON AND OPTICAL OBSERVATIONS OF WZ SAGITTAE IN QUIESCENCE

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WZ Sge is the prototype of a subclass of dwarf novae with an extremely long recurrence period. In addition, it exhibits rapid oscillations at 27.87 s and 28.96 s. We present our preliminary analysis of *XMM-Newton* and optical observations taken in 2003 May, almost 2 years after the 2001 outburst.

We observed WZ Sge with *XMM-Newton* for ~10 ksec on 2003 May 16. WZ Sge was detected at a combined total of ~5 cts s^{-1} in the three EPIC cameras. Our spectral analysis reveals a multi-temperature plasma, with a flux of 7.0×10^{-12} ergs $cm^{-2}s^{-1}$ in the 2–10 keV band, much brighter than the 2.9×10^{-12} ergs $cm^{-2}s^{-1}$ measured from the 1996 May *ASCA* data. Inferred 0.2–10 keV luminosity of WZ Sge was 2.5×10^{30} ergs s^{-1} for the adopted distance of 43 pc (Thorstensen 2003).

We also obtained optical photometry of WZ Sge with the MDM 2.4 m telescope on 2003 May 15-20. In these data, we detect a coherent periodicity of 28.9593(1) s, with an amplitude of ~1.2%. There is some power at this period in the 2–10 keV band X-ray light curve, although we cannot claim an independent detection (Figure 1). We do not detect the 27.87 s signal either in the optical or in the X-rays.

Patterson et al. (1998) favored the magnetic accretor model as the origin of the rapid oscillations in WZ Sge, based on a weak detection of the 27.87 s in the 1996 May *ASCA* observation. In this model, we expect the spin period pulse to be persistent; and, if it ceases, we would not expect other high frequency signals to be able to persist. Thus, our results present a serious challenge to this interpretation. If WZ Sge is magnetic, it does not resemble any other magnetic binaries we know about.

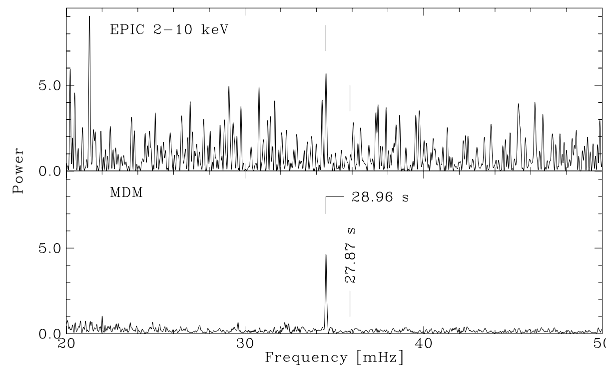

Fig. 1. Power spectra of WZ Sge from *XMM-Newton* and optical data both taken in 2003 May.

Alternatively, the rapid oscillations in WZ Sge may be due to non-radial *g*-mode pulsation of the primary. In addition to the difficulties enumerated by Welsh et al. (2003), this model needs a mechanism to generate X-ray modulation at the dominant period *du jour*, albeit weakly.

It appears that, after 25 years of observations, with some of the most powerful instruments on and above Earth, we are no closer to understanding WZ Sge!

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