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RAPID VARIATIONS IN V2275 Cyg (NOVA Cyg 2001#2)

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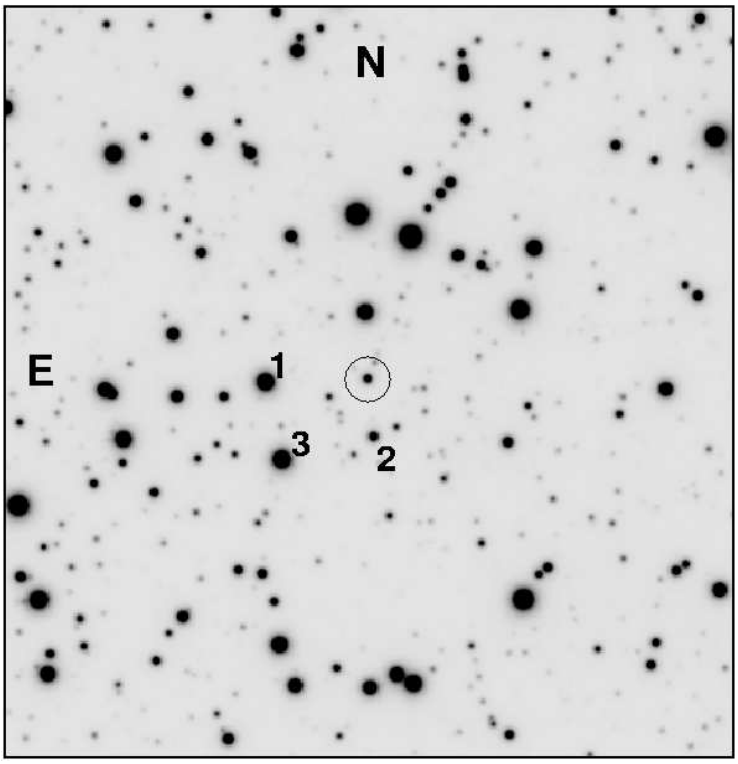

Figure 1. A finder chart for V2275 Cygni (circled) and comparison stars (listed in Table 1). The image is an average of 162 exposures, each 120 seconds in length. The field of view is 3.′5 on a side.

Nova Cygni 2001#2 was discovered by A. Tago and K. Matayama on Aug. 18 (Nakamura, 2001) at a magnitude of 6.6 . The brightness decay from maximum was one of the fastest ever recorded and it shows characteristics of recurrent novae (Kiss et al., 2002).

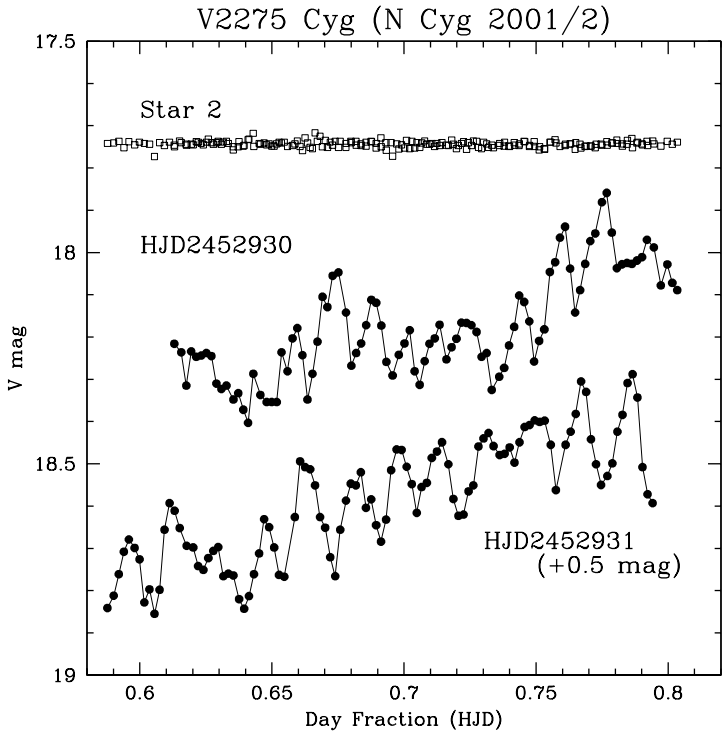

Figure 2. The V-band light curves of V2275 Cyg obtained with the VATT. The Oct. 19 data have been displaced by +0.5 mag.

Time resolved photometry in Oct. 2002 by Balman et al. (2003) revealed large amplitude variations with a period of 8 or 11 hours which might be associated with its orbital period.

We observed V2275 Cyg beginning on HJD2452930.61 (18 Oct 2003) with the 1.8-m Vatican Advanced Technology Telescope (VATT). This was 790 days after maximum light. Observations continued the next night starting at HJD2452931.59. The CCD was binned 2×2 providing a scale of 0.4 arcsec/pixel. V-band exposures were 120 seconds with 30 second readout time covering about 10 hours over the two nights. The resulting images were bias subtracted and flat-fielded and instrumental magnitudes were measured using aperture photometry. Three comparison stars near the nova (Figure 1) were also measured and their positions listed in Table 1. Approximate V-band magnitudes for the stars were estimated from zero-point and airmass coefficients measured at the VATT on earlier runs with standard magnitude errors estimated to be ±0.05 mag.

The VATT light curves shown in Figure 2 were obtained by subtracting the instrumental magnitude of Star 1 from the nova instrumental magnitude. The light curve for Star 2 relative to Star 1 is also shown and demonstrates both stars were constant over the observing run. Variations in individual measurements show an RMS scatter of 0.01 mag per exposure for $V \sim 18$ mag stars.

V2275 Cyg clearly shows light variations with a full amplitude of 0.2 mag and a period of about 20 minutes as well as a slower brightening trend on both nights. At the time of the observations V2275 Cyg varied between $18.0 < V < 18.5$ mag. The long-period variation suggests a period > 7 hours and may be the same phenomenon seen by Balman et al. (2003). The short period variation has not been previously observed and may be a quasi-periodic oscillation (QPO) or a stable periodicity such as a spinning white dwarf.

Power-spectrum analysis gives a period of 0.410±0.005 hours for the variation. A plot of this period against the normalized light curve is shown in Figure 3 and indicates that this period was stable over the two nights of data. This supports the possibility that the short-term light variations come from reprocessing of light from an asynchronous spinning white dwarf, but more data is needed to confirm the stability of the period.

We acknowledge travel assistance from the University of Notre Dame Department of Physics. This work based on observations with the VATT: the Alice P. Lennon Telescope and the Thomas J. Bannan Astrophysics Facility.

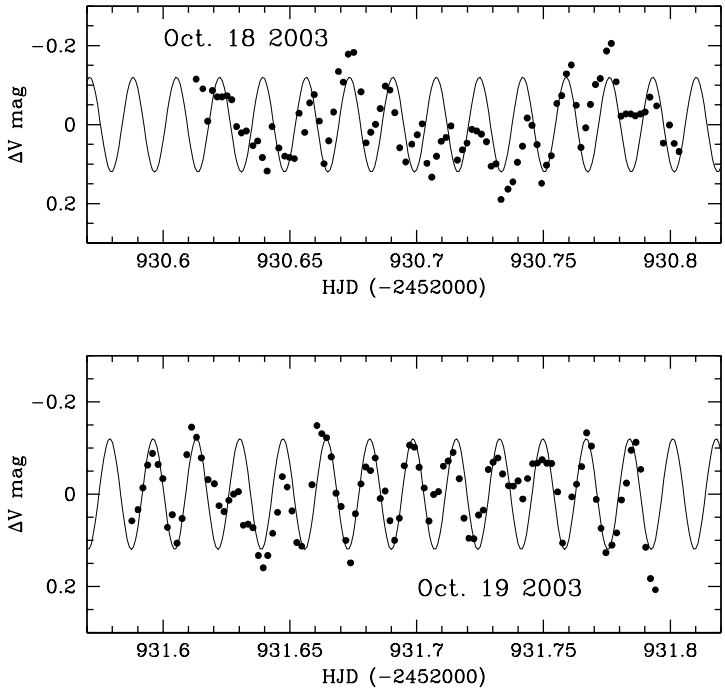

Figure 3. The normalized light curve compared to a sinusoidal oscillation with a period of 0.41 hours.

Table 1. Comparison Stars

Star	RA (2000)	Dec (2000)	V mag
1	21:03:04.80	+48:45:51	15.50
2	21:03:01.96	+48:45:37	17.75
3	21:03:04.38	+48:45:31	15.33

References:

Balman, S., et al. 2003, *IAU Circ*, 8074
Kiss, L.L., et al. 2002, *A&A*, **384**, 982
Nakamura, A. 2001, *IAU Circ*, 7686