COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4644

Konkoly Observatory
Budapest
27 October 1998
*HU ISSN 0374 – 0676*

# DETECTION OF SUPERHUMPS IN V2051 Oph

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V2051 Oph was discovered by Sanduleak (1972) and identified as a cataclysmic variable by Bond and Wagner (1977). This star was classified as novalike variable by Downes et al. (1997). The following ephemeris was reported for eclipses (Echevarria and Alvarez, 1993).

$$\mathrm{Min} = \mathrm{HJD}2444787.321141 + 0.062427860 \times E \quad (1)$$

R. Stubbings reported an outburst on May 18, 1998 (Vsnet-obs 11960). This long outburst lasted until May 30, 1998 (Vsnet-obs 12411). One of the authors (S.K.) observed this outburst for three nights from May 21 to May 23, 1998. CCD Observations were done with a 25cm Schmidt Cassegrain (F/6.3) and a Bitran BT-20 CCD camera (Site 502A, 512 × 512 pixels). Each exposure was 60–90 seconds at interval of 120–180 seconds. GSC6815:626 ($17^{\mathrm{h}}08^{\mathrm{m}}22\overset{\mathrm{s}}{.}46$, $-25^\circ51'49\overset{''}{.}9$) was used as a comparison and USNO0600.13191139 ($17^{\mathrm{h}}08^{\mathrm{m}}15\overset{\mathrm{s}}{.}738$ $-25^\circ49'57\overset{''}{.}59$) was used as a check star. The constancy of the comparison star was confirmed to a level of 0.05 mag. No color correction was applied, but heliocentric corrections were applied before the following analysis, where differential magnitudes relative to the comparison star are used. The log of observations is given in Table 1.

Observations outside eclipses (phase 0.075–0.925 based on the equation 1.) were normalized using an average magnitude of each night and analyzed using Phase Dispersion Minimization (PDM) method (Stellingwerf 1978). The resultant theta diagram is displayed in Figure 1. The best superhump period is 0.06423 day. The existence of superhumps was subsequently confirmed by Patterson et al. (1998). Figure 2 is light curve folded on this period (outside eclipses). The superhump period is 2.9% longer than the orbital period (Echevarria and Alvarez, 1993) and it is a typical value for ratio of superhump to orbital period of SU UMa-type of CVs (e.g. see Table 1 in Nogami et al., 1997). The presence of a long outburst with a plateau (observation reported to Vsnet, data not shown) also agrees with this classification. Thus we concluded that V2051 Oph is a new member of SU UMa-type dwarf novae.

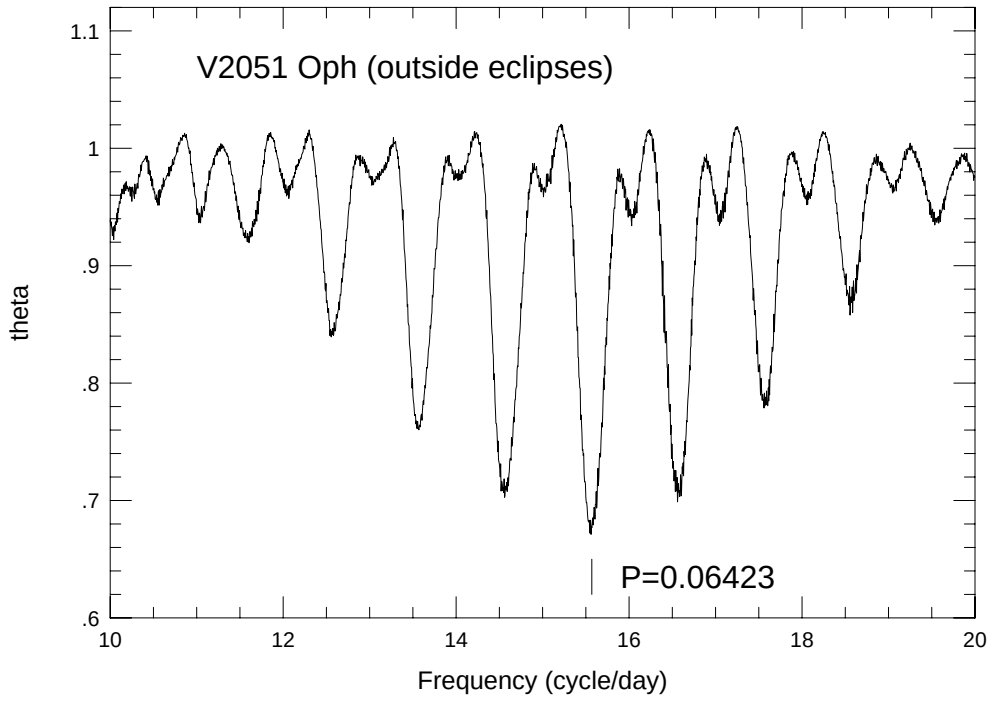


**Figure 1.** Theta diagram of the period analysis

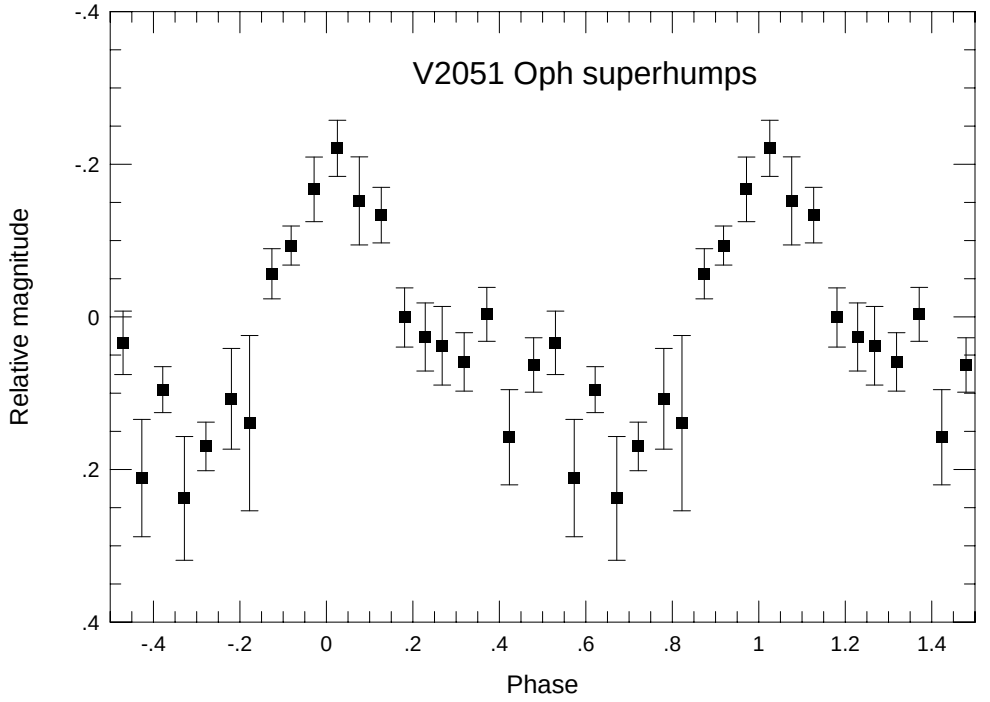


**Figure 2.** Folded light curve

Table 1: The log of the observations

| Date in UT | No. of frames | Filter |
|---|---|---|
| 1998 May 21.118–21.211 | 39 | Cousins R |
| 1998 May 22.080–22.265 | 96 | none |
| 1998 May 23.105–23.211 | 43 | none |

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