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THE SUPERHUMPS IN V592 HERCULIS†

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The first outburst of V592 Her, recorded on Sonneberg plates of 1986, was discovered by Richter (1968). He classified the object as a nova. Later it was re-classified as dwarf nova or x-ray nova because of the shape of its light curve and the blue colour at maximum (Duerbeck 1987). A second outburst in 1986 was reported by Richter (1991). The rareness of outbursts and their large amplitude of about 10 magnitudes led Richter (1991) to re-classify it as recurrent nova or dwarf nova of long cycle time. V592 Her is a potential member of the dwarf nova subtype SU UMa (see, e.g., Warner 1995) – similar to the group of WZ Sge stars, which show rare superoutbursts, but not normal ones.

The most recent outburst started on 1998 August 26.8 (UT), was reported by T. Kinnunen (Waagen 1998), and followed by spectroscopy (R.M.) and photometry (H.D.). Here we present results of the photometric observations.

Differential CCD photometry in B and V was carried out with the 0.91 m Dutch telescope at ESO La Silla. Exposure times were 120 s for the V and 180 s for the B frames. Sky conditions were not always photometric. The position of the object in the northern evening sky permitted runs of about 90 minutes duration. This was sufficient to obtain light curves which clearly show brightness variations.

Photometric reductions were made using daophot in PC-IRAF[1]. Magnitude differences between V592 Her and the mean of the two 15^{m} comparison stars USNO-A1.0 U1050_08092747 and U1050_09092380, located north-west and south-west of the variable, were derived. Light curves, which show the presence of superhumps, are displayed in Fig. 1. Individual data will be published in a forthcoming catalogue of long-term photometry of variables (Sterken et al. 1998).

The form and strength of the superhumps are different in the three nights. Similar variations, also observed in other SU UMa type dwarf novae like HV Vir (Leibowitz et al. 1994), are likely caused by a beat phenomenon between superhump and orbital periods.

A straight line fit was subtracted from the photometric data of the three nights, and the resulting brightness variations were analyzed, using the Period98 programme (Sperl 1997). The most likely period was found to be 0.06005 day in V, and 0.06378 day in B. Other

†Based on observations collected at the European Southern Observatory, La Silla, Chile

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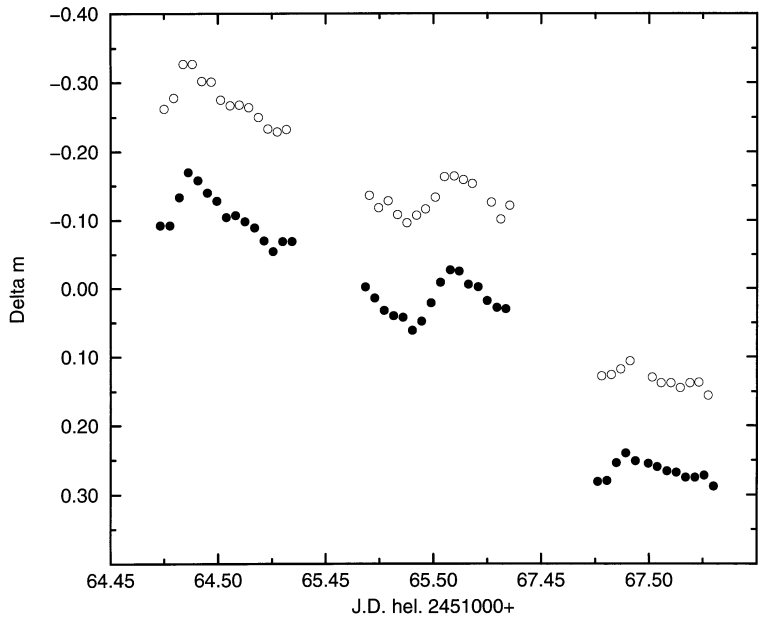

Figure 1. Light curves of V592 Her at superoutburst during the nights 1998 Sept. 7/8, 8/9 and 10/11. V magnitudes are shown as filled circles, B magnitudes as open circles, shifted by $0\overset{\mathrm{m}}{.}4$ to fainter values. Magnitude differences are relative to the two comparison stars, as described in the text. Note the breaks in the time axis

neighbouring aliases, 0.05667 and 0.06812 days, can be rejected with high probability. The times of maximum light, averaged from the two light curves, are J.D. hel. (max) = 2 451 064.4852, 2 451 065.5074, and 2 451 067.4888. Using the first and last of these times, the improved possible superhump periods are $P = 0.06007$ and 0.06391 days, respectively, with errors of about ± 0.0002 day.

If we assume that $P = 0.06007$ day is the correct superhump period, the predicted orbital period is $P_{\mathrm{orb}} = 0.05898$ day (1.416 hrs), according to the recent calibration of the Schoembs-Stolz relation (Arenas & Mennickent 1998). The longer period predicts the orbital period 0.06239 day (1.497 hrs).

If V592 Her belongs to the WZ Sge group of SU UMa stars, whose members only show the rare superoutbursts and have orbital periods in the range 1.25 and 1.39 hours, the superhump period of 0.06007 days is favored. Additional observations of superhumps and photometry at the very faint (23^{m}) minimum stage may give an unambiguous answer.

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