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UBV – Observations of the Recent Outbursts of Three Cataclysmic Variables

In this contribution I report about results of *UBV* measurements of three outbursting cataclysmic variables, namely Nova Pup 1991, HV Vir and OY Car, which were observed as targets of opportunity at the ESO 1-m-telescope on La Silla between 1992, April 16 and 25.

All observations were obtained sequentially with the one-channel photometer. Measurements of E-region stars were used to tie the instrumental system into the standard *UBV* system. The formal accuracy of the transformation was found to be of the order of 0^m.01 in all passbands. However, the extraordinary colours which make cataclysmic variables bluer than the available standard stars may introduce an additional transformation error. The results of the photometry of the three target stars are given in Table 1. The errors quoted there were derived mostly from counting statistics (but see the case of OY Car below) and do not contain the contribution of the standard transformation.

Nova Pup 1991 was detected by Camilleri (1992). *UBV* photometric measurements are reported by Gilmore (1992). A visual light curve was published by the AAVSO (AAVSO alert note 156 (1992)). According to these measurements, Nova Pup 1991 is a moderately fast nova. The present observations indicate a slight decline of the star over a time base of nine days. The present magnitudes and colours are significantly brighter and redder than those obtained at the same epoch by Gilmore (IAU Circ. No. 5527) who found $V = 11.15$, $B - V = 0.13$, $U - B = -0.75$ on April 19.40. The difference cannot be explained by accidental measurement errors but indicate a severe difference of the photometric systems.

HV Vir was classified as a classical nova which had its outburst in 1929 (see Duerbeck 1987). The present outburst was detected by Schmeer (1992) on 1992, April 19.917. The characteristics reported in IAU Circ. Nos. 5503, 5505, 5509, 5516 and 5517 leave no doubt that the star must be reclassified as a dwarf nova of WZ Sge type. The present observations started on 1992, April 23.135 and could only be continued until April 25.265. During this time, HV Vir declined gradually. Outbursts of WZ Sge stars have all properties of superoutbursts of SU UMa stars. A comparison of the colours of HV Vir with those of SU UMa systems in superoutburst (Bruch 1984) indicates that it is slightly bluer in $B - V$ than the SU UMa stars, but significantly bluer in $U - B$. Results of time series observations of HV Vir in white light on 1992 Apr. 23 and 24 will be reported in more detail at another place.

OY Car was undergoing a superoutburst which started on 1992, April 7 (Horne 1992). Light curves in *UBV* were observed on April 16, 19 and 20. On April 23 and 24, white light observations were undertaken, complemented by a few *UBV* measurements. On April 24, a single *UBV* measurement was obtained. Here, I report only about the night-to-night variations of magnitude and colours, postponing an

analysis of the light curves of the individual nights to a later publication. For April 16, 19 and 20, Table 1 contains mean out of eclipse magnitudes and colours. In this case the quoted errors are standard deviations, calculated from the individual

Table 1: *UBV* – data on Nova Pup 1991, HV Vir and OY Car

Name	Date (1992)	UT	J.D. 2448700+	<i>V</i>	<i>B</i> – <i>V</i>	<i>U</i> – <i>B</i>
Nova Pup 1991	Apr. 16	0:58	28.540	10.94 ±0.02	0.27 ±0.01	-0.56 ±0.01
	Apr. 19	1:52	31.578	10.93 ±0.01	0.26 ±0.01	-0.57 ±0.01
	Apr. 20	0:11	32.508	10.96 ±0.01	0.29 ±0.01	-0.57 ±0.01
	Apr. 22	23:43	35.488	10.98 ±0.01	0.27 ±0.01	-0.60 ±0.01
	Apr. 23	23:55	36.497	11.00 ±0.01	0.27 ±0.01	-0.60 ±0.01
	Apr. 24	23:48	37.492	10.98 ±0.01	0.23 ±0.01	-0.59 ±0.01
HV Vir	Apr. 23	3:15	35.635	12.12 ±0.02	-0.14 ±0.02	-0.93 ±0.02
	Apr. 24	2:49	36.617	12.44 ±0.02	-0.13 ±0.02	-0.91 ±0.02
	Apr. 24	6:54	36.788	12.47 ±0.01	-0.09 ±0.02	-0.90 ±0.02
	Apr. 25	6:21	37.765	12.63 ±0.01	-0.08 ±0.01	-0.87 ±0.01
OY Car	Apr. 16	1:42 – 2:12	28.571 – 28.592	12.26 ±0.07	0.04 ±0.06	-0.86 ±0.08
	Apr. 19	2:27 – 5:12	31.602 – 31.717	12.74 ±0.08	0.07 ±0.04	-0.63 ±0.07
	Apr. 20	0:18 – 3:54	32.5013 – 32.663	12.65 ±0.11	0.08 ±0.04	-0.71 ±0.07
	Apr. 23	0:00	35.500	12.97 ±0.03	0.05 ±0.01	-0.79 ±0.04
	Apr. 24	0:12	36.508	13.54 ±0.07	0.04 ±0.04	-0.87 ±0.03
	Apr. 24	2:21	36.598	13.73 ±0.03	0.00 ±0.05	-0.99 ±0.04
	Apr. 25	0:14	37.510	15.20 ±0.08	0.19 ±0.12	-1.06 ±0.12

UBV-measurements and are dominated by flickering activity and in particular by the effect of superhumps. They are therefore larger than the errors quoted otherwise in Table 1. In the course of time, OY Car shows a marked decline from superoutburst maximum, until on April 25 it had almost reached its quiescent magnitude which Vogt (1981) observed to be at $V = 15.55$. The colours during outburst as well as those close to quiescence differ somewhat from values observed at other epochs at similar phases (Vogt 1981). Moreover, $U - B$ shows a marked variability during the course of the outburst.

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