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

Number 5240

Konkoly Observatory
Budapest
20 February 2002

HU ISSN 0374 – 0676

BV(RI)$_C$ OBSERVATIONS OF SOME DWARF NOVAE

SPOGLI, C.[1]; FIORUCCI, M.[1]; TOSTI, G.[1]; NUCCIARELLI, G.[1]; GIRETTI, A. M.[1]; MONACELLI, G.[2]; MACCHIA, E.[2]

[1] Observatorio Astronomico, Universita' di Perugia, Via A. Pascoli I-06100 Perugia, Italy

[2] Associazione Astronomica Umbra, Via Ilci 7, Todi, Italy

Dwarf Novae (DN) are erupting cataclysmic variable stars. The 2-6 mag outbursts last from few days to more than a month and the recurrence times can be as short as a few days and as long as 30 years (see e.g. Warner 1995). According to differences in their outburst light curves, they are divided into three sub-groups, the U Gem stars (UG), the SU UMa stars (SU) and Z Cam stars (ZC). The U Gem systems have normal outbursts which last a few days to weeks. In SU UMa systems, except for normal outbursts, there are so-called superoutbursts which last weeks and occur more regularly than the normal ones. In Z Cam systems, during decline from some outbursts, so-called standstills are observed in which the systems stay at a brightness level somewhat below maximum for a prolonged interval of time, before returning to quiescence.

In this brief paper we present a sample of photometric B, V, R_C, I_C observations of dwarf novae made in the years 1993-1997 with the 0.40 m Automatic Imaging Telescope at the Perugia Astronomical Observatory (Tosti et al. 1996). The telescope is mainly devoted to the monitoring of a large sample of blazars (Fiorucci and Tosti 1996), however, a fraction of the telescope time is dedicated to the photometric observations of DNe. The instruments used and the photometric techniques have been already described in Spogli et al. (1998). Part of the data were elaborated by the Associazione Astronomica Umbra, using the usual IRAF photometric packages. For many DNe we used the calibration stars reported in Misselt (1996), moreover we calibrated them with the I_C filter, by observing, on photometric nights, several standard stars (Landolt, 1992) having $(B-V)$ from $-0\overset{\mathrm{m}}{.}2$ to $1\overset{\mathrm{m}}{.}4$ over a wide range of airmass. The same Landolt stars were used to compute the standard magnitude for the other DNe during the photometric nights.

The data (Table 1) were obtained during the years in which we worked to automatize the telescope. Sometimes the weather conditions varied suddenly or the telescope blocked and therefore, in some cases observations exist only in one filter or in some of the filters. However, these data are always important since, joined to other photometric observations, can be used to draw the historical light curve.

The dwarf novae selected have been observed in different phases of luminosity: some of them were in outburst, others at minimum. For some dwarf novae, that were in outburst at the time of the observations, we calculated the spectral slope α (see table 2) using the same procedure used in Spogli et al. (1998), neglecting interstellar reddening.

Table 1: $BV(RI)_C$ magnitudes of some Dwarf Novae

Name	Type	Date UT	JD (2449000+)	B	V	R_C	I_C
KW And	UG	95/09/29	990.816			17.3±0.3	
RX And	ZC	94/10/18	644.405		13.50±0.05		
		94/10/30	657.476	11.45±0.05	11.24±0.05	11.09±0.05	9.87 ±0.02
		94/11/04	662.426	11.29±0.09	11.15±0.05	11.13±0.05	10.95±0.03
		94/11/04	662.441	11.25±0.08	11.17±0.05	11.12±0.05	10.91±0.02
		94/12/15	703.341	12.23±0.08	12.21±0.05	12.05±0.05	11.71±0.02
AK Cnc		95/01/12	729.555			15.82±0.08	
	UG	95/02/02	750.434		15.92±0.08	15.77±0.07	15.51±0.06
YZ Cnc	SU	95/01/12	729.621	13.11±0.06	13.21±0.06	13.35±0.06	13.13±0.05
SS Cyg	UG	94/10/18	644.362		12.24±0.05		
		94/11/09	667.239		12.51±0.05		
V503 Cyg	UG	95/07/06	905.497			14.69±0.07	
V516 Cyg	UG	97/07/06	1636.552		17.2±0.3	16.9±0.2	16.7±0.2
		97/08/06	1667.527	15.04±0.13	15.17±0.09	14.69±0.06	14.68±0.08
		97/08/15	1676.461		16.7±0.3	16.5±0.2	15.52±0.07
		97/08/19	1680.449	15.84±0.12	14.93±0.09	14.91±0.08	14.43±0.06
		97/08/21	1682.441		17.8±0.3	16.7±0.3	16.3±0.2
		97/08/31	1692.455		16.4±0.2	16.1±0.2	15.75±0.07
		97/09/01	1693.437		16.3±0.2	15.88±0.09	15.08±0.07
		97/09/02	1694.421	13.98±0.09	13.81±0.04	13.71±0.09	13.69±0.08
V542 Cyg	UG	95/07/06	905.525			16.4±0.2	
V792 Cyg	UG	95/07/01	900.562			15.85±0.09	
V811 Cyg	UG	95/07/01	900.585			16.1±0.2	
		95/07/13	912.495		15.24±0.08	15.03±0.05	14.88±0.06
		95/07/16	915.556		15.71±0.07	15.32±0.06	15.33±0.07
		95/07/21	920.506			15.71±0.05	
		95/08/03	932.435			15.18±0.05	
		95/09/29	990.648		17.2±0.3	16.4±0.2	16.1±0.2
V823 Cyg	UG	95/07/23	912.517			14.96±0.08	
V1006 Cyg	UG	95/08/03	932.443			16.1±0.2	
V1028 Cyg	UG	95/08/03	932.465	13.65±0.08	13.86±0.05	13.76±0.07	13.69±0.06
V1251 Cyg	UG	95/09/27	988.754			15.01±0.08	
V1316 Cyg	SU	95/07/01	900.602		17.3±0.3	16.5±0.2	16.3±0.2
		95/07/16	915.478	16.4 ±0.3	16.3 ±0.2	16.1 ±0.1	15.92±0.06
		95/08/23	953.321		16.1±0.09	15.84±0.08	15.34±0.04
V1390 Cyg	SU	95/07/16	915.568		16.6±0.2	15.86±0.09	15.13±0.07
V1504 Cyg	SU	95/07/21	920.543			14.38±0.06	
U Gem	UG	93/02/03	022.361		14.45±0.05		
		93/03/17	064.331		14.30±0.07		
		93/12/30	352.367		11.44±0.05		
		94/11/17	674.592		14.18±0.05		
AH Her	ZC	94/04/28	470.449	13.97±0.09	13.80±0.05	13.57±0.05	13.01±0.03
		94/04/29	471.432	13.66±0.09	13.38±0.04	13.04±0.04	12.75±0.03
		94/05/01	473.466	12.67±0.09	12.56±0.05	12.39±0.04	12.26±0.03
		94/05/15	488.467	13.91±0.08		13.41±0.04	13.07±0.04
		94/05/21	494.513	12.87±0.07	12.62±0.05	12.45±0.04	12.27±0.03
		94/06/02	506.377	13.41±0.12	13.36±0.06	13.07±0.05	12.86±0.05
		94/06/06	510.457	12.71±0.07	12.23±0.08	11.84±0.04	11.72±0.03
		94/06/16	520.407	13.80±0.10	13.76±0.05	13.33±0.04	12.80±0.04
		94/06/17	521.475		14.22±0.05	13.84±0.04	13.32±0.03
		94/06/19	523.451	14.68±0.09	14.12±0.05	13.64±0.05	13.15±0.04
		94/06/20	524.444	14.35±0.14	14.14±0.05	13.58±0.04	
		94/06/22	526.383	14.56±0.09	14.10±0.05	13.64±0.04	13.16±0.03
		94/06/24	528.436	12.42±0.09	12.28±0.06	12.24±0.04	
		94/06/30	534.385	14.54±0.07	13.92±0.05	13.55±0.04	13.17±0.04

Table 1: (continued)

Name	Type	Date UT	JD (2449000+)	B	V	R_C	I_C
PR Her	UG	95/06/30	899.398			15.17±0.08	
V611 Her	UG	95/06/30	899.367			16.8±0.3	
V632 Her	UG	95/06/30	899.437			16.4±0.2	
T Leo	SU	95/02/02	750.628		15.95±0.09	15.81±0.09	15.22±0.07
RZ LMi	UG	95/02/02	750.568		15.16±0.08	15.04±0.06	14.95±0.04
IR Lyr	UG	95/06/30	899.553			15.19±0.08	
V415 Lyr	UG:	95/06/30	899.598			16.5±0.2	
V419 Lyr	ZC	95/06/30	899.588			15.43±0.08	
BI Ori	UG	94/12/01	729.481			16.2±0.1	
		95/01/16	733.431		15.69±0.06	15.56±0.05	15.27±0.06
CZ Ori	UG	93/01/27	043.462	13.74±0.08	13.38±0.05	13.69±0.03	
		94/01/12	394.491		14.65±0.08		
		94/01/18	400.455		15.07±0.09		
		94/10/14	640.538			16.1±0.1	
		94/10/22	649.508		12.87±0.05		
		94/10/27	654.494		15.99±0.08	15.52±0.05	14.59±0.05
		94/11/17	675.589		15.46±0.07	15.21±0.05	14.53±0.05
		94/12/02	690.403	13.14±0.08	13.19±0.05	13.06±0.05	12.77±0.05
		95/01/12	729.461	15.11±0.09	15.28±0.05	15.02±0.05	14.35±0.05
		95/01/16	733.329			15.75±0.07	
		95/02/02	750.399	16.3 ±0.2	15.99±0.08	15.52±0.05	14.35±0.05
		95/09/27	988.981	13.39±0.06	13.43±0.05	13.33±0.05	13.04±0.05
		95/09/29	990.931	14.52±0.07	14.65±0.05	14.39±0.05	13.87±0.05
		96/12/03	1421.565		15.89±0.07	15.39±0.04	14.69±0.04
		96/12/04	1422.417		15.74±0.06	15.29±0.04	14.42±0.04
		96/12/05	1423.437		15.57±0.05	15.13±0.04	14.51±0.04
RU Peg	UG	94/10/18	644.365		12.65±0.05		
KT Per	ZC	94/10/18	644.396		14.71±0.05		
NS Per	UG	95/09/27	988.933			17.2±0.3	
PU Per	UG	95/09/29	990.859			17.1±0.3	
PY Per	ZC	95/01/12	729.431	14.09±0.08	14.01±0.06	14.21±0.06	13.56±0.06
		95/01/16	733.254		15.18±0.09	15.07±0.06	14.88±0.06
		95/09/27	988.923			16.1±0.2	
TZ Per	ZC	94/10/13	639.569			14.29±0.05	
		94/10/18	644.415	13.43±0.07	13.22±0.05	12.97±0.05	12.74±0.05
		94/10/18	644.536	13.45±0.06	13.17±0.05	12.98±0.05	12.77±0.05
		95/01/16	733.345	12.93±0.06	12.61±0.05	12.58±0.05	12.28±0.05
FY Vul	ZC	95/08/23	953.298	14.24±0.08	13.99±0.05	13.71±0.05	13.43±0.05

Table 2: The spectral slope of some Dwarf Novae

Name	Type	JD(2449000+)	α
RX And	ZC	662.426	0.4±0.1
YZ Cnc	SU	729.621	0.9±0.1
V516 Cyg	UG	1694.421	0.4±0.1
V1028 Cyg	UG	932.465	0.9±0.2
AH Her	ZC	473.466	0.2±0.1
CZ Ori	UG	690.403	0.3±0.2

References:

Fiorucci, M., Tosti, G., 1996, *A&AS*, **117**, 475
Landolt A.U., 1992, *AJ*, **104**, 340
Misselt K.A., 1996, *PASP*, **108**, 146
Spogli C., Fiorucci M., Tosti G., 1998, *A&AS*, **130**, 485
Tosti, G., Pascolini, S., Fiorucci, M., 1996, *PASP*, **108**, 706
Warner B., 1995, *"Cataclysmic Variable Stars"*, Cambridge University Press, Cambridge