

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

Number 4555

Konkoly Observatory
Budapest

13 February 1998

HU ISSN 0374 – 0676

**PHOTOELECTRIC AND CCD TIMES OF MINIMA
OF 19 ECLIPSING BINARY SYSTEMS**

IMRE BARNA BÍRÓ¹, TAMÁS BORKOVITS¹, TIBOR HEGEDÜS¹, ZSOLT PARAGI²

¹ Baja Astronomical Observatory of Bács-Kiskun County, Baja, Szegedi út, P.O. Box 766, H-6500 Hungary
E-mail: barna@electra.bajaobs.hu

² FÖMI Satellite Geodetic Observatory, Budapest, P.O. Box 546, H-1373 Hungary

We present photoelectric and CCD photometric minima observations of 19 eclipsing binary systems. Most of them are stars with apsidal motion or at least eccentric binary systems, selected from the listing of Hegedüs (1988). Some minima observations (e.g. for UZ Leonis) are part of complete light curve coverages.

One part of the photoelectric observations was carried out at Piszkestető Mountain Station of the Konkoly Observatory of the Hungarian Academy of Sciences with a 20 in. f/15 Cassegrain telescope. The photometer used was equipped with an unrefrigerated EMI9058QB photomultiplier tube and Schott UG2 (for U), BG12+GG13 (for B) and GG11 (for V) filters. This system is referred to as Pi50 in Table 1. The other part of the photoelectric measurements was made at Baja Astronomical Observatory with a Starlight-I photometer, equipped with an unrefrigerated EMI9924A multiplier tube and Schott filters UG1 (matching Johnson's U), GG400+BG25 (matching B) and OG515 (matching V), mounted on the 20 in. f/8.4 Ritchey-Chrétien telescope (Ba50 in Table 1). The unfiltered CCD observations were carried out with an ST-5 (1995-96), and an ST-7 (1997) camera installed on the 20 in. RC telescope mentioned above.

The observations were made between 1995-1998. Reduction of the photoelectric data was made by standard procedures. For the reduction of the CCD frames we used the IRAF package. All the minima times were computed using the parabolic fitting method.

Table 1 presents the derived minima times. The content of the first two columns is self-explaining. The error in the last digit appears in the third column. In the fourth column the types of minima are marked (I for primary, and II for secondary ones), while in the fifth column the number of individual data involved in the parabolic fit is given. The columns from sixth to eighth describe the filters used, the first three letters of the observers' names and the codes of the instrumentation. The last column contains the comparisons used, identified by their BD, GSC or HD numbers.

Table 1

Star	Min. HJD +2400000	error ±	Min. type	Points used	Filter	Obs.'s name	Instr.	Comp.
AS Cam	50519.5178	2	II	78	-	Bor	Ba50 (ST7)	GSC 4347-0466
RZ Cas	50247.5014	8	I	91	-	Bor	Ba50 (ST5)	GSC 4317-1437
	50815.2545	1	I	51	V	Par+Bor	Pi50	BD+67°215
	50815.2541	6	I	48	B	Par+Bor	Pi50	
PV Cas	50244.4443	3	II	134	-	Bor	Ba50 (ST5)	GSC 4010-1545
	50279.4665	1	II	40	V	Bir	Pi50	BD+58°2555
	50279.4667	4	II	40	B	Bir	Pi50	
VW Cep	50171.4028	3	I	18	V	Bor	Pi50	BD+75°765
	50171.4030	4	I	18	B	Bor	Pi50	
	50171.402	1	I	19	U	Bor	Pi50	
	50171.5410	3	II	27	V	Bor	Pi50	
	50171.5418	1	II	27	B	Bor	Pi50	
	50171.543	1	II	27	U	Bor	Pi50	
XX Cep	50297.445	1	I	71	V	Bir	Pi50	BD+63°2030
	50297.446	1	I	68	B	Bir	Pi50	
GK Cep	50210.451	2	I	146	-	Bir	Ba50 (ST5)	GSC 4465-1764
	50225.4286	5	I	81	-	Bir	Ba50 (ST5)	
MR Cyg	50230.4597	2	I	104	-	Bor	Ba50 (ST5)	GSC 3609-1293
V453 Cyg	50235.4809	5	I	628	-	Bir	Ba50 (ST5)	GSC 2683-3541
V477 Cyg	50237.4445	2	I	120	-	Bir	Ba50 (ST5)	GSC 2674-0910
V836 Cyg	49919.4008	5	I	34	-	Par	Ba50 (ST5)	GSC 2715-0017
V1136 Cyg	50270.4672	4	I	83	-	Bir	Ba50 (ST5)	GSC 2150-3445
AK Her	50275.4763	3	I	47	V	Bor	Ba50	BD+16°3123
	50275.474	1	I	48	B	Bor	Ba50	
	50310.4582	5	I	32	V	Bor	Ba50	
	50310.4574	2	I	32	B	Bor	Ba50	
	50508.574	1	I	102	-	Bor	Ba50 (ST7)	GSC 1536-0928
	50512.5802	2	II	83	-	Bor	Ba50 (ST7)	
CC Her	49876.4996	3	I	38	-	Par	Ba50 (ST5)	GSC 0946-1166
DI Her	50238.4879	5	II	135	-	Bir	Ba50 (ST5)	GSC 2109-1273
UV Leo	50499.4473	4	I	44	V	Bor	Pi50	BD+14°2277
	50499.4471	2	I	44	B	Bor	Pi50	
	50513.5375	3	II	33	-	Bor	Ba50 (ST7)	GSC 0845-0136
UZ Leo	50507.445	2	I	18	V	Heg	Pi50	BD+14°2279
	50509.606	1	II	27	V	Heg	Pi50	
	50509.607	1	II	26	B	Heg	Pi50	
	50510.5361	9	I	16	V	Heg	Pi50	
	50510.5386	6	I	16	B	Heg	Pi50	
	50512.3872	1	I	24	V	Heg	Pi50	
	50512.388	1	I	21	B	Heg	Pi50	
FT Ori	50494.3442	5	I	36	V	Bor	Pi50	BD+22°1250
	50494.3446	3	I	36	B	Bor	Pi50	
ST Per	50813.330	1	I	54	V	Bor+Par	Pi50	HD 18615
	50813.3301	6	I	47	B	Bor+Par	Pi50	
U Sge	50287.5178	9	I	79	V	Bor	Ba50	BD+19°3976
	50287.5184	7	I	79	B	Bor	Ba50	

Remarks on some of the variables:

XX Cep: This Algol-system is an apsidal motion candidate star (e.g. Hegedüs, 1988), but recently Borkovits and Hegedüs (1996) tried to explain its period variation by light-time effect. The new times of minima (see also Hegedüs et al. 1996) do not support their solution.

AK Her: The new times of minima are also inconsistent with the light-time solution of Borkovits and Hegedüs (1996).

CC Her: This minimum time was already published in Hegedüs et al. (1996), but there we missed the correction for Daylight Saving Time (DST), and the GSC number of the comparison was also incorrect. These are the correct data.

PV Cas: The initial comparison candidate star for PV Cassiopeiae, GSC 4010-1432, showed variations of about 0.8 mag against the check star GSC 4010-1545, and some other fainter stars in the CCD frame.

This work was partly supported by the Local Government of Bács-Kiskun County.

References:

Borkovits T., Hegedüs T., 1996, *A&ApSS*, **120**, 63

Hegedüs T., 1988, *CDS Bull.*, **35**, 15

Hegedüs T., Bíró I. B., Borkovits T., Paragi Zs., 1996, *IBVS* No. 4340

ERRATA

In IBVS Nos. 4555 and 4633 we presented CCD photometric minima observations (together with photoelectric ones) of several eclipsing binary systems. Due to an unfortunate programming bug most of the minimum times have an error in the third decimal place of JD. This erratum contains the corrected moments of minima. Table 1 shows the corrigenda to IBVS No. 4555. Table 2 should be used as a total replacement of the Table of IBVS No. 4633.

Table 1

Star	Min. HJD +2400000	Star	Min. HJD +2400000
AS Cam	50519.5238	V453 Cyg	50235.4843
PV Cas	50244.4435	V477 Cyg	50237.4480
GK Cep	50210.453	V1136 Cyg	50270.4694
	50225.4297	DI Her	50238.4929
MR Cyg	50230.4608	UV Leo	50513.5487

Table 2

Star	Min. HJD +2400000	error ±	Min. type	Points used	Filter	Obs.'s name	Instr.	Comp.
RT And	50964.5050	2	I	51	V	Bir	Ba50	HD 218915
AB And	50966.5525	3	II	30	V	Bir	Ba50	GSC 2763-0683
	50984.4721	4	II		V	Bir	Ba50	
	51016.5005	1	I	41	V	Bor	Ba50	
OO Aql	50950.486:	1	I	19	V	Bor	Ba50	HD 187146
	50956.5658:	2	I	61	V	Bir	Ba50	
	50967.4659	1	II	45	V	Bor	Ba50	
Y Cam	50872.4672	3	I	77	-	Bor	Ba50	GSC 4527-1983
AS Cam	50900.351	1	II	163	V	Bor	Ba50	GSC 4347-0466
RZ Cas	50871.4318	3	I	414	-	Bor	Ba50	GSC 4317-1578
TV Cas	51005.45:	1	II	190	V	Bir	Ba50	GSC 3665-0026
PV Cas	51015.5244	5	I	55	V	Bir	Ba50	GSC 4010-1432
VW Cep	50871.6279	5	I	102	-	Bor	Ba50	GSC 4585-2387
	50900.5736	3	I	54	V	Bor	Ba50	
	50941.3443	3	II	51	V,B,R	Bor	Ba50	
	50941.4859	3	I	61	V,B,R	Bor	Ba50	
	50942.4573	5	II	59	V,B,R	Bir	Ba50	
	50942.5990	5	I	28	V,B,R	Bir	Ba50	
XX Cep	51018.517:	6	II	91	V	Bor	Ba50	GSC 4288-0186
CQ Cep	50948.5431	6	I	200	V	Bir	Ba50	GSC 3991-1316
DL Cyg	51038.485	3	I	170	V,R	Bor	Ba50	GSC 3595-0816
MR Cyg	50962.4954	1	II	87	V	Bir	Ba50	GSC 3609-1220
	51014.4830	5	II	124	V	Bir	Ba50	
V477 Cyg	50974.4054	2	I	53	V	Bor	Ba50	GSC 2674-0910
AK Her	50865.6038	2	I	53	V,B	Bir	Pi50	BD+16°3123
	50866.6601	1	II	78	-	Bor	Ba50	GSC 1536-0928
	50884.5722	2	I	82	V	Bor	Ba50	
	50903.5413	3	I	78	V	Bir	Ba50	
	50971.4060	3	I	266	R	Bor	Ba50	

Table 2 (cont.)

Star	Min. HJD +2400000	error \pm	Min. type	Points used	Filter	Obs.'s name	Instr.	Comp.
GU Her	50970.434	2	I	215	-	Bor	Ba50	GSC 2581-2418
	50983.4675	3	I	200	-	Bir	Ba50	
	51033.421	4	II		-	Bir	Ba50	
HS Her	50945.4749	2	I	283	V	Bir	Ba50	GSC 2113-2242
	50972.4946	3	II	343	V	Bir	Ba50	
	50981.5011	3	I	125	V	Bir	Ba50	
MM Her	50940.5670	5	I	182	V	Bir	Ba50	GSC 1565-2199
SW Lac	50961.518	1	II	49	V	Bir	Ba50	GSC 3215-0906
	50986.5358	1	II	54	V	Bir	Ba50	
	51017.4831	1	I	35	V	Bor	Ba50	
UV Leo	50899.4051	1	II	60	V	Bir	Ba50	GSC 0845-0121
GP Vul	50946.4643	8	II	65	V	Bir	Ba50	GSC 2151-2731

T. Borkovits, I.B. Bíró