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CCD TIMES OF MINIMA OF ECLIPSING BINARY SYSTEMS

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We present CCD photometric minima observations of 22 eclipsing binary systems. Most of them are possible triple systems, or binaries having eccentric orbits, selected from Borkovits & Hegedüs (1996), or from the listing of Hegedüs (1988). Some minima observations (e.g. IM Aurigae, GSC 3822 1056) are part of complete light curve coverages.

Most of the measurements were carried out at Baja Astronomical Observatory with three different CCD cameras, mounted on the 20-inch $f/8.4$ Ritchey–Chrétien telescope. These were an SBIG ST-6 (referred as ST6 in the 7th column of Table I), an SBIG ST-7 (ST7), and an Apogee AP-7 (AP7). The first minima observations of the newly discovered variable GSC 3822 1056 were carried out at Observatorio del Teide (Tenerife, Spain) using the IAC80 (0.8-m $f/11.3$ Cassegrain) telescope and a Wright Instruments (WRI) camera in 1997.

Reduction of the CCD frames was made with a customly developed IRAF¹ package. The minima times were computed with parabolic fitting, and in some cases with linearized Pogson-method.

Table 1 presents the derived minima times. The contents of the first two columns are self-explanatory. 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). The columns from fifth to seventh describe the filters used (if any), the first three letters of the observers' names (Bír = I.B. Bíró, Bor = T. Borkovits) and the codes of the instrumentation. The last column contains the comparisons used, identified by their HD, GSC or SAO numbers.

¹IRAF is distributed by the National Optical Astronomical Observatories, operated by the Association of the Universities for Research in Astronomy, inc., under cooperative agreement with the National Science Foundation

Table

Star	Min. HJD 2400000 +	Error \pm	Min. type	Filter	Obs.'s name	Instr.	Comp.
RT And	51021.4303	3	II	<i>V</i>	Bír	ST7	HD 218915
	51463.2480	1	I	-	Bor	ST6	HD 236062
	51463.5634	7	II	-	Bor	ST6	"
AB And	51716.4610	1	I	-	Bor	AP7	2763-0878
OO Aql	51380.5004	1	II	-	Bír	AP7	1058-0689
	51679.5093	3	II	-	Bor	AP7	"
HP Aur	51080.5584	1	II	<i>R</i>	Bír	ST7	2401-1128
	51124.6623	3	II	<i>R</i>	Bír	ST7	"
	51196.5140	1	I	<i>V</i>	Bír	ST7	"
IM Aur	51568.390	1	II	<i>V</i>	Bor	ST7	3358-1208
	51576.4930	3	I	<i>R</i>	Bor	ST7	"
	51593.331	1	II	<i>V</i>	Bír	ST7	"
	51593.333	1	II	<i>B</i>	Bír	ST7	"
	51593.333	1	II	<i>R</i>	Bír	ST7	"
	51596.4493	6	I	<i>R</i>	Bor	ST7	"
	51601.4389	2	I	<i>R</i>	Bor	ST7	"
	51603.3087	5	II	<i>V</i>	Bír	ST7	"
	51611.4166	3	I	<i>V</i>	Bír + Bor	ST7	"
	51611.4171	1	I	<i>R</i>	Bír + Bor	ST7	"
	51611.4174	8	I	<i>B</i>	Bír + Bor	ST7	"
	51808.4836	1	I	-	Bír	AP7	"
	Y Cam	51133.6194	2	I	<i>R</i>	Bor	ST7
51315.4352		3	I	-	Bor	AP7	"
RZ Cas	51135.5832	2	I	<i>R</i>	Bor	ST7	4317-1578
	51162.484	:	II	<i>V</i>	Bír	ST7	"
	51165.4644	1	I	<i>V</i>	Bír	ST7	"
	51183.3930	1	I	<i>R</i>	Bor	ST7	"
	51379.4136	1	I	-	Bor	AP7	"
	51783.4085	1	I	-	Bor	AP7	"
VW Cep	51284.3671	2	I	-	Bor	AP7	4585-2387
	51661.3433	7	II	<i>V</i>	Bor	AP7	4585-2167
	51661.4800	5	I	<i>V</i>	Bor	AP7	"
	51814.4129	5	II	-	Bor	AP7	"
	51814.5500	5	I	-	Bor	AP7	"
XX Cep	51454.4119	5	I	-	Bor	ST6	4288-0186
CW Cep	51449.469	1	II	-	Bor	ST6	4282-0348
DL Cyg	51113.371	5	II	<i>V, R</i>	Bír	ST7	3595-0816
	51381.450	2	I	-	Bor	AP7	SAO 51164
MR Cyg	51689.489	1	I	-	Bor	AP7	3609-2087
AK Her	51301.4589	2	I	-	Bor	AP7	1536-1834
	51617.6013	3	I	<i>R</i>	Bor	ST7	1536-0928
	51680.4087	1	I	-	Bor	AP7	1536-1834
DI Her	51707.391	1	I	-	Bor	AP7	2109-0167
GU Her	51691.416	1	I	-	Bor	AP7	2581-1969
HS Her	51302.4332	2	I	-	Bor	AP7	2113-1658
	51681.509	1	II	-	Bor	AP7	"
SW Lac	51778.3737	4	II	-	Bor	AP7	3215-1406
	51778.5325	1	I	-	Bor	AP7	"
UV Leo	51197.6475	3	II	<i>V</i>	Bír	ST7	0845-0121
	51207.5492	3	I	-	Bor	AP7	0845-0271
	51218.3502	2	I	-	Bor	AP7	0845-0189
	51597.3051	3	II	<i>V</i>	Bír	ST7	0845-0121

Table 1 (cont.)

Star	Min. HJD 2400000 +	Error ±	Min. type	Filter	Obs.'s name	Instr.	Comp.
IZ Per	51097.3945	1	I	V	Bír	ST7	3670-1506
DW UMa	51675.3726	2	I	-	Bor	AP7	3822-0070
	51675.5090	2	I	-	Bor	AP7	"
GP Vul	51692.4426	4	I	-	Bor	AP7	2151-5639
GSC 3822 1056	50495.5219	4	I	R	Bír	WRI	3822-0070
	50495.5224	6	I	V	Bír	WRI	"
	50495.675	1	II	R	Bír	WRI	"
	50495.678	1	II	V	Bír	WRI	"
	50496.602	2	II	V	Bír	WRI	"
	50496.605	1	II	R	Bír	WRI	"
	50496.7590	2	I	R	Bír	WRI	"
	50496.7592	3	I	V	Bír	WRI	"
	50497.6881	7	I	V	Bír	WRI	"
	50497.6891	8	I	R	Bír	WRI	"
	50498.4633	9	II	V	Bír	WRI	"
	50498.4671	7	II	R	Bír	WRI	"
	50498.6186	4	I	V	Bír	WRI	"
	50498.6191	2	I	R	Bír	WRI	"
	50499.7040	3	II	R	Bír	WRI	"
	50500.6327	8	II	V	Bír	WRI	"
	50539.530	2	I	V	Bír	WRI	"
	50540.4587	5	I	V	Bír	WRI	"
	50547.5841	8	I	I	Bír	WRI	"
	51228.4120	5	I	-	Bír	AP7	"
	51228.5678	1	II	-	Bír	AP7	"
	51236.46923	1	I	-	Bír	AP7	"
	51236.6253	3	II	-	Bír	AP7	"
	51237.3985	4	I	-	Bír	AP7	"
	51237.5547	2	II	-	Bír	AP7	"
	51238.3315	6	I	-	Bír	AP7	"
	51238.480	:	II	-	Bír	AP7	"
	51242.3566	2	I	-	Bír	AP7	"
	51242.5144	2	II	-	Bír	AP7	"
	51250.4125	5	I	-	Bír	AP7	"
	51250.566	:	II	-	Bír	AP7	"
	51262.345	1	II	-	Bír	AP7	"
	51262.499	1	I	-	Bír	AP7	"
	51263.4271	1	I	-	Bír	AP7	"
	51349.423	1	II	-	Bír	AP7	"
	51356.4002	5	I	-	Bír	AP7	"
	51675.4300	8	II	-	Bor	AP7	"
	51715.411	:	II	-	Bír	AP7	"

Remarks on some of the variables:

DW UMa: This is the only one nova-like variable in the above list. After a quiescent period in 1998-99 it returned back to its normal state.

GSC 3822 1056: The following new ephemeris was calculated:

$$\text{Min}_I = \text{HJD } 2450495.5212 + 0^d3098906857 \times E.$$

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References:

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