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CCD MINIMA OF SELECTED ECLIPSING BINARIES IN 2000

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Sixty new times of minima for various eclipsing binaries have been determined using an unfiltered CCD camera at the Prince George Astronomical Observatory in 2000.

The CCD camera, a SBIG ST6, was mounted at the cassegrain focus of the 61-cm telescope and cooled to -40° C. The camera used a telecompressor lens and operated at $f/7$. Images were taken continuously using the data acquisition software CCDSoft on “focus” mode. Depending on exposure time for the star (usually between 10 and 60 seconds), exposures were taken approximately every minute. The duration of observing runs varied between one and three hours, and typically covered 100–200 or more frames. Data reduction was by MIRA. For more details, see Nelson (2000).

A variety of methods (usually a minimum of three) was used to determine the time of minimum, depending on the nature of the data set. The methods available were: the tracing paper method, bisectors of chords, curve fitting (quadratic on central part, Fourier fit on the full curve if appropriate) — all on a spreadsheet, and Kwee–van Woerden (1956) — by separate software. For each time of minimum, the standard deviation of the resulting times (from the various methods) was used as a starting point in setting the estimated error, given in Table 1, column 5.

For each star, the available times of minimum in the literature were gathered and entered in a spreadsheet; the $O - C$ plots therein were used to predict times of minimum before observing on a given night and, based on earlier works, to determine the type of minimum. The latter is given in column 6 (I = primary, II = secondary).

The $O - C$ plots frequently hinted at, or sometimes strongly indicated a period change; this information is presented in column 7. The period behaviour for some of these stars has been well studied; others await new data and analyses. All the $O - C$ plots, in spreadsheet form, may be obtained from the World-Wide Web at the relevant URL in the references.

Some of the results were less accurate than desirable due to problems of sharply varying sky transparency during the run and limitations in the duration of the run due to the onset of clouds and other factors.

Another problem was the occasional ambiguous identity of the variable; the GCVS 4 position did not agree with the GSC catalogue position, or with RealSky images ($100 \times$ compression of POSS digital scans). In these cases, the equivalences are given in the footnotes.

Three light curves at minimum were chosen at random for display. See Figures 1–3.

Table 1

UT date	Star	Comp. star (GSC No.)	Minimum HJD 24. . .	Estimated error	Type	Period change?	New period
2000-10-15	AD And	3641-0023	51832.81735	0 ^d 00007	I	—	0 ^d 9861911
2000-06-02	BL And	3635-1961	51697.82162	0.00009	I	—	0.7223759
2000-09-25	CN And	2787-1803	51812.8787	0.0002	I	yes?	0.4627898
2000-10-11	DS And	2816-1250	51828.6893	0.0001	I	—	1.0105195
2000-08-05	LO And	3637-0897	51761.8118	0.0003	II?	yes?	0.3808235
2000-02-05	SS Ari*	1758-0121	51579.7217	0.0003	II	—	0.4059839
2000-09-27	ZZ Aur	2915-0468	51814.89102	0.00006	I	—	0.6012168
2000-12-28	AH Aur	1887-1240	51906.95915	0.0006	II	—	0.4942714
2000-02-13	AC Boo	3474-0834	51588.0118	0.0006	I	yes	0.3524441
2000-03-29	TY Boo	2568-0991	51632.79821	0.00005	I	—	0.3171503
2000-12-09	UZ CMi	0184-1875	51887.9262	0.0001	II	—	0.7619496
2000-09-23	AZ Cam	4547-1052	51810.8735	0.0001	I	yes?	1.3192308
2000-03-04	WW Cam	4673-1078	51607.7921	0.0006	I	yes?	2.2743713
2000-08-30	CW Cas	4020-1387	51786.8746	0.0002	II	yes?	0.3188638
2000-09-16	V364 Cas	3270-0612	51803.8936	0.0004	I	—	1.5430662
2000-09-26	V364 Cas	3270-0612	51813.9229	0.0003	II	—	1.5430662
2000-07-22	V523 Cas	3257-1068	51747.8792	0.0001	I	yes	0.2336930
2000-12-07	V541 Cas*	4050-0957	51885.8766	0.0001	II	—	0.9098486
2000-03-05	VZ Cep	4470-1497	51608.7237	0.0003	I	yes?	1.1833637
2000-12-11	WZ Cep	4486-1402	51889.6940	0.0001	I	—	0.4174453
2000-05-15	BE Cep	3996-0441	51679.8576	0.0002	II	—	0.4243941
2000-12-07	EF Cep	4523-0854	51885.7625	0.0004	I	—	0.6061077
2000-01-21	EG Cep	4585-0165	51564.86095	0.00008	I	—	0.5446224
2000-03-19	GW Cep A	4502-0724	51622.5520	0.0001	I	—	0.3188440
2000-03-31	GW Cep B	4502-0724	51634.80913	0.00015	II	—	0.3188440
2000-04-25	OT Cep	4504-0663	51659.80612	0.00005	I	—	0.9624610
2000-04-14	RW Com	1991-1659	51648.77918	0.00025	I	—	0.2373453
2000-05-12	RZ Com	1990-3503	51676.7736	0.0003	I	—	0.3385073
2000-07-24	CV Cyg	3137-0227	51749.8469	0.0002	II	—	0.9834109
2000-06-15	DK Cyg	2712-1841	51710.8499	0.0003	I	yes	0.4706928
2000-05-13	V387 Cyg*	2714-0538	51677.9260	0.0004	I	—	0.6405966
2000-07-17	V401 Cyg*	2654-1313	51742.8339	0.0002	I	yes	0.5827244
2000-09-25	V463 Cyg*	2656-4079	51812.7731	0.0002	I	—	2.1175747
2000-06-16	V513 Cyg	3170-0502	51711.8397	0.0002	I	—	1.0561803
2000-12-13	V680 Cyg	3968-0228	51891.8040	0.0003	I	—	1.1991437
2000-05-20	RZ Dra	3916-1962	51684.89711	0.00025	I	—	0.5508762
2000-03-06	RW Gem	1864-1948	51609.776	0.002	II	—	2.8654961
2000-04-16	GW Gem*	1933-0570	51650.77409	0.00007	I	—	0.6594445
2000-03-19	SZ Her	2610-1214	51622.96964	0.00025	II	—	0.8180968
2000-09-22	CO Lac	3992-1927	51809.9448	0.0002	I	apsidal	1.5422071
2000-05-26	EM Lac	3982-3238	51690.91843	0.00005	I	—	0.3891347
2000-09-21	PP Lac	3984-1619	51808.6546	0.0001	I	—	0.4011633
2000-03-26	XZ Leo	1412-0423	51629.807	0.002	I	yes	0.4877373
2000-05-08	CE Leo*	1985-1274	51672.79847	0.00005	I	—	0.3034290
2000-06-03	TZ Lyr	3107-0618	51698.82501	0.00005	I	—	0.5288272
2000-12-11	BO Mon*	4850-0630	51889.9281	0.0001	I	yes	2.2251719
2000-12-13	V496 Mon	0151-1326	51891.8954	0.0002	I	—	0.6607624
2000-05-26	V508 Oph*	1019-1850	51690.8308	0.0001	I	—	0.3447905
2000-12-28	V343 Ori*	0725-0502	51906.8087	0.0003	I	—	0.8091418
2000-09-27	BO Peg*	1127-1477	51814.7788	0.0001	I	yes?	0.5804273
2000-08-05	BX Peg*	2197-1946	51761.91545	0.0001	I	yes	0.2804168
2000-12-11	V432 Per*	2856-0823	51889.8058	0.0001	I	yes	0.3833100
2000-04-14	AU Ser	1502-1573	51648.88903	0.00013	I	yes	0.3864935

Table 1 (continued)

UT date	Star	Comp. star (GSC No.)	Minimum HJD 24...	Estimated error	Type	Period change?	New period
2000-02-12	RZ Tau	1274-1281	51586.7378	0 ^d .0001	I	—	0 ^d .4156768
2000-10-06	AH Tau	1804-2485	51823.8420	0.0001	I	yes?	0.3326779
2000-09-24	CT Tau	1871-0434	51811.8973	0.0001	I	yes	0.6668249
2000-10-05	EQ Tau*	1260-0575	51822.9035	0.0001	I	—	0.3413471
2000-01-29	XY UMa	3805-0990	51572.7472	0.0002	I	—	0.478996?
2000-01-30	AG Vir	0871-0330	51573.9120	0.0001	II	—	0.6426530
2000-04-25	GP Vul	2151-1825	51659.9171	0.0002	I	—	1.0324998

Notes:

SS Ari = GSC 1758-0116; V541 Cas = GSC 4051-1764; V387 Cyg = GSC 2714-0556; V401 Cyg = GSC 2654-2502; V463 Cyg = GSC 3170-0931; GW Gem = GSC 1933-0692; CE Leo = GSC 1985-1209; BO Mon = GSC 4837-1454; V508 Oph = GSC 1019-1840; V343 Ori = GSC 0725-1137; BO Peg = GSC 1127-0916; BX Peg = GSC 2197-1458; V432 Per = GSC 2856-1647; EQ Tau = GSC 1260-0909

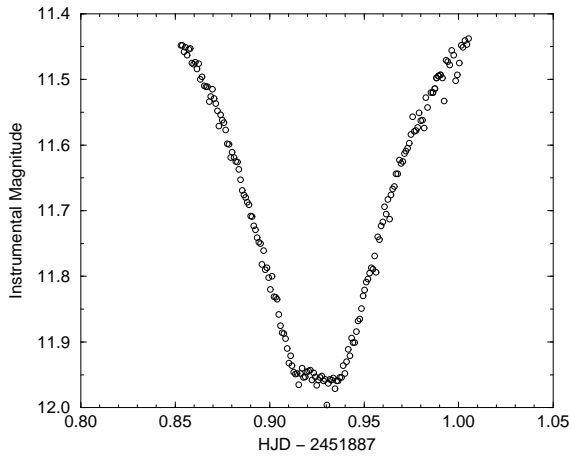


Figure 1. Secondary minimum of the 0^d.76 W UMa-type binary UZ Canis Minoris

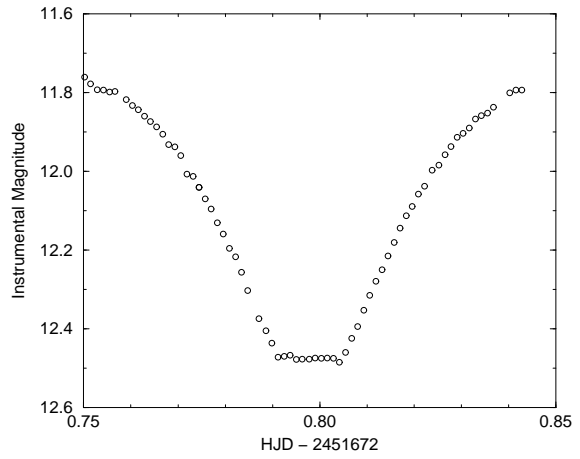


Figure 2. Primary minimum of the 0^d.30 W UMa-type binary CE Leonis

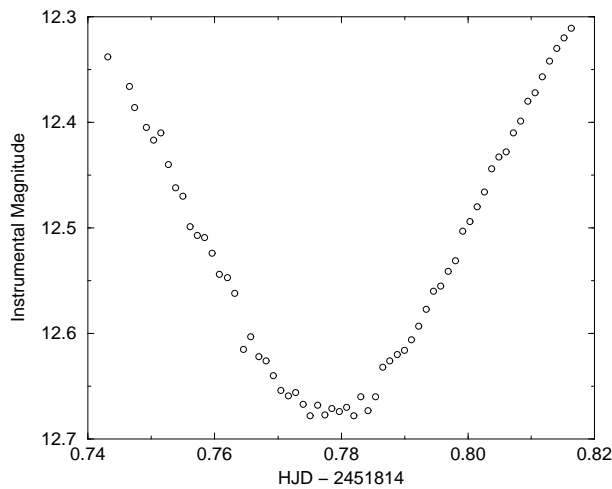


Figure 3. Primary minimum of the 0^d.58 β Per-type binary BO Pegasi

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Nelson, R.H., 2000, *IBVS*, No. 4840
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http://www.cnc.bc.ca/physics/EB_Database.htm

ERRATUM FOR IBVS 5040

In IBVS 5040, the time of minimum for the GW Cep on 2002-03-19 (UT) should read 51622.8521.