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PHOTOELECTRIC MINIMA OF SOME ECLIPSING BINARY STARS

KRAJCI, TOM

PO Box 1351 Cloudcroft, New Mexico 83117; e-mail: tom_krajci@tularosa.net

Observatory and telescope:

Observations were initially conducted in Albuquerque, New Mexico from an urban yard under moderate light pollution, and later in Cloudcroft, New Mexico under dark skies. 28cm Schmidt-Cassegrain, 2640 mm focal length. German equatorial mount.

Detector:

SBIG ST-7E, -25°C , covering 8×5 arcminutes, 18 micron pixels (binned 2×2). Unfiltered.

Method of data reduction:

All CCD frames calibrated with bias, dark, and flat frames using AIP4WIN software. Differential aperture photometry performed using AIP4WIN software[†].

Method of minimum determination:

Digital tracing paper method, bisection of chords, curve fitting, and (occasionally) Kwee and van Woerden (1956).

Times of minima:

Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
UU And	53390.6446	0.0001	I	None	
HU And	53383.6564	0.0010	II	None	
HU And	53386.6583	0.0006	I	None	
HV Aqr	53562.9286	0.0002	I	None	
V0936 Aql	53551.8549	0.0003	I	None	
V1647 Aql	53552.8633	0.0004	II	None	
V1647 Aql	53554.9500	0.0006	I	None	
SZ Ari	53303.9399	0.0003	I	None	
DO Aur	53290.9805	0.0002	I	None	
DO Aur	53296.8987	0.0005	II	None	
FV Aur	53341.9457	0.0004	I	None	
II Aur	53295.0000	0.0004	I	None	
V0355 Aur	53359.6683	0.0028	I	None	Period 17.6437d
CP Cam	53364.7472	0.0002	I	None	
XZ Cnc	53398.9169	0.0004	I	None	
AC Cnc	53496.6341	0.0002	I	None	
AH Cnc	53437.7466	0.0012	I	None	
BI CVn	53422.9478	0.0002	I	None	
DM CVn	53406.0036	0.0006	I	None	

[†] AIP4WIN software available at: <http://www.willbell.com/aip/index.htm>

Times of minima:					
Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
SZ CMa	53441.7343	0.0003	I	None	
AD CMa	53438.7463	0.0004	I	None	
CZ CMa	53472.6424	0.0006	I	None	Period 0.819000d
TX CMi	53320.9432	0.0002	I	None	
TX CMi	53353.8320	0.0002	II	None	
AV CMi	53354.8487	0.0002	II	None	Secondary displaced to phase 0.567
AV CMi	53364.9467	0.0002	I	None	
AQ Cap	53558.8997	0.0005	I	None	
RZ Cas	53431.6769	0.0001	I	None	
GK Cas	53370.6791	0.0002	I	None	
MR Cas	53349.6018	0.0003	I	None	Period 0.435222d
MR Cas	53359.6116	0.0002	I	None	
MR Cas	53364.6170	0.0003	II	None	
NU Cas	53362.5623	0.0004	I	None	
V0361 Cas	53288.8869	0.0002	I	None	
FH Cep	53379.6191	0.0020	I	None	
GW Cep	53363.6701	0.0002	I	None	
NR Cep	53365.5746	0.0004	I	None	
WY Cet	53377.5879	0.0002	I	None	
YY Cet	53388.6423	0.0005	I	None	
DY Cet	53370.5634	0.0003	I	None	
CM Com	53430.8923	0.0002	I	None	Period 0.554515d
EK Com	53405.0020	0.0002	II	None	
NU Cyg	53309.5762	0.0003	I	None	
NU Cyg	53315.6228	0.0003	II	None	
QW Cyg	53301.5852	0.0005	I	None	
QW Cyg	53303.6435	0.0004	II	None	
V0490 Cyg	53256.6755	0.0001	I	None	
V0490 Cyg	53260.6752	0.0003	II	None	Secondary displaced to phase 0.508
V0693 Cyg	53308.6092	0.0003	I	None	
V0693 Cyg	53312.5802	0.0004	II	None	
V0803 Cyg	53327.5486	0.0006	I	None	
V0842 Cyg	53302.6309	0.0004	I	None	
V0842 Cyg	53336.5620	0.0015	II	None	
V0842 Cyg	53339.5750	0.0020	I	None	
V0884 Cyg	53340.5786	0.0002	I	None	
V0907 Cyg	53277.6193	0.0006	I	None	Period 0.541365d
V0907 Cyg	53335.5456	0.0005	I	None	
V0907 Cyg	53345.5604	0.0004	II	None	
V0931 Cyg	53297.5772	0.0005	II	None	
V0931 Cyg	53306.6318	0.0005	I	None	
V0979 Cyg	53286.6933	0.0003	I	None	
V0979 Cyg	53290.6178	0.0003	II	None	
V1045 Cyg	53271.6341	0.0002	I	None	
V1045 Cyg	53273.6476	0.0012	II	None	
V1189 Cyg	53321.5616	0.0004	I	None	
V1189 Cyg	53335.6270	0.0004	II	None	
FR Del	53275.6673	0.0006	I	None	
FR Del	53279.6834	0.0012	II	None	
LU Dra	53554.6673	0.0025	I	None	
AM Eri	53410.6157	0.0002	I	None	
GZ Gem	53342.9039	0.0002	I	None	Period 0.612503d
GZ Gem	53383.9423	0.0004	I	None	
V0501 Her	53511.8879	0.0003	II	None	Secondary displaced to phase 0.479
V0501 Her	53550.7611	0.0010	I	None	
V0513 Her	53280.6102	0.0003	II	None	
V0513 Her	53282.5837	0.0008	I	None	

Times of minima:					
Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
V0731 Her	53265.5900	0.0010	II	None	
V0731 Her	53266.6510	0.0008	I	None	
V0731 Her	53269.6381	0.0002	I	None	
V0742 Her	53254.6583	0.0002	I	None	
VX Lac	53394.5872	0.0001	I	None	
AG Lac	53320.6757	0.0004	I	None	
AG Lac	53337.6005	0.0007	II	None	
LU Lac	53348.6273	0.0004	I	None	
LU Lac	53383.5881	0.0010	I	None	
LU Lac	53384.6334	0.0005	II	None	
BW Leo	53385.9134	0.0008	I	None	
BW Leo	53399.9136	0.0003	II	None	
T LMi	53502.6573	0.0001	I	None	
RV Lib	53479.7613	0.0018	I	None	
SS Lib	53526.8560	0.0004	I	None	
TY Lib	53509.7925	0.0001	I	None	
VZ Lib	53438.8952	0.0003	I	None	Period 0.358255d
AA Lib	53540.6664	0.0004	I	None	
AE Lib	53512.7166	0.0007	I	None	
BW Lib	53515.7327	0.0003	I	None	
ES Lib	53439.9745	0.0008	I	None	Period 0.883042d
ES Lib	53466.9120	0.0010	II	None	
FU Lib	53481.8796	0.0002	I	None	
FW Lib	53552.7437	0.0003	I	None	Period 2.24278d
GI Lib	53511.7209	0.0001	I	None	
GK Lib	53473.9609	0.0001	I	None	Period 2.116464d
GV Lib	53540.7386	0.0003	I	None	
GV Lib	53553.6436	0.0008	II	None	Secondary displaced to phase 0.510.
GY Lib	53528.6759	0.0002	I	None	
HQ Lib	53551.6482	0.0006	I	None	
IL Lib	53526.6623	0.0015	I	None	
IT Lib	53527.6762	0.0010	I	None	
WW Lyn	53377.0729	0.0080	I	None	Period 5.81237d
V0417 Lyr	53287.6162	0.0003	II	None	
V0417 Lyr	53288.6689	0.0005	I	None	
V0429 Lyr	53355.5560	0.0004	I	None	
DW Mon	53385.7150	0.0004	I	None	
FV Mon	53377.7700	0.0004	I	None	
HM Mon	53331.9214	0.0004	I	None	
HP Mon	53398.7696	0.0001	I	None	
IM Mon	53432.6380	0.0015	I	None	
V0383 Mon	53439.7277	0.0100	I	None	
V0383 Mon	53474.6296	0.0003	I	None	
V0384 Mon	53396.7042	0.0009	I	None	
V0384 Mon	53410.6861	0.0006	II	None	
V0457 Mon	53389.6872	0.0004	I	None	
V0457 Mon	53399.6724	0.0003	II	None	
V0464 Mon	53473.6687	0.0006	I	None	
V0515 Mon	53441.6251	0.0002	I	None	
V0524 Mon	53431.6135	0.0002	I	None	
V0635 Mon	53405.7374	0.0009	I	None	
V1016 Oph	53544.7038	0.0003	II	None	Period 0.407161d
V1016 Oph	53552.6465	0.0005	I	None	
V1022 Oph	53432.9905	0.0003	I	None	Period 0.239497d
V1022 Oph	53472.8668	0.0002	II	None	
V1120 Oph	53461.9671	0.0003	I	None	
V1120 Oph	53474.9337	0.0003	II	None	
V1677 Oph	53469.9700	0.0003	I	None	
V1677 Oph	53472.9871	0.0005	II	None	

Times of minima:					
Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
V1811 Oph	53482.8990	0.0009	II	None	
V1811 Oph	53495.9456	0.0019	I	None	
V2377 Oph	53272.6344	0.0013	I	None	
VV Ori	53422.6298	0.0010	I	None	
ES Ori	53358.8185	0.0004	I	None	
FK Ori	53308.9866	0.0002	I	None	
V0641 Ori	53430.6416	0.0002	II	None	
V0645 Ori	53348.9153	0.0001	I	None	
V0667 Ori	53294.0073	0.0004	I	None	
V1016 Ori	53352.2943	0.0080	I	None	
V1027 Ori	53442.7711	0.0025	II	None	Secondary displaced to phase 0.555
BQ Peg	53368.6013	0.0005	I	None	
CF Peg	53341.5907	0.0003	II	None	
CF Peg	53342.6239	0.0003	I	None	
EY Peg	53280.7213	0.0004	I	None	
HI Peg	53346.6818	0.0010	I	None	
DV Per	53261.9751	0.0003	I	None	
DX Per	53362.6586	0.0004	I	None	
FW Per	53404.5994	0.0001	I	None	
V0364 Per	53260.9584	0.0002	I	None	Correct coords $02^{\text{h}}44^{\text{m}}01^{\text{s}}+36^{\circ}17'29''$. Also known as GSC 2337-0333
V0364 Per	53302.8795	0.0004	II	None	
V0434 Per	53297.9262	0.0004	I	None	
V0434 Per	53301.9482	0.0005	II	None	
SU Psc	53257.8957	0.0002	I	None	Correct coords $01^{\text{h}}29^{\text{m}}25^{\text{s}}+19^{\circ}37'41''$
DV Psc	53258.8140	0.0002	I	None	
DV Psc	53258.9677	0.0003	II	None	
DF Pup	53481.6175	0.0002	I	None	
KW Pup	53437.6524	0.0003	II	None	
UU Sge	53343.5779	0.0003	I	None	
GN Sge	53293.6231	0.0004	II	None	
GN Sge	53298.6549	0.0004	I	None	
BK Sgr	53553.8302	0.0004	I	None	
V1068 Sgr	53514.9055	0.0007	I	None	
V1068 Sgr	53521.9351	0.0002	I	None	
V1068 Sgr	53526.9289	0.0002	II	None	
V1068 Sgr	53538.9530	0.0005	I	None	
V4197 Sgr	53543.8560	0.0004	I	None	
V4202 Sgr	53559.7963	0.0020	I	None	
V0784 Sco	53460.9640	0.0001	I	None	Period 1.52629d
V1044 Sco	53549.7020	0.0004	I	None	
V1054 Sco	53559.7037	0.0020	I	None	
EZ Sct	53525.9314	0.0004	I	None	
FG Sct	53528.9414	0.0001	I	None	
CQ Ser	53515.9580	0.0007	I	None	
CQ Ser	53522.7975	0.0006	I	None	
LX Ser	53500.8030	0.0002	I	None	
LX Ser	53500.9613	0.0003	I	None	
LX Ser	53501.7540	0.0006	I	None	
LX Ser	53501.9116	0.0002	I	None	
LX Ser	53504.7636	0.0002	I	None	
LX Ser	53504.9238	0.0009	I	None	
MX Ser	53539.7019	0.0015	I	None	
MX Ser	53544.7983	0.0030	II	None	
MX Ser	53551.7110	0.0003	I	None	
Y Sex	53498.6604	0.0013	II	None	
BN Tau	53306.8512	0.0003	I	None	
GQ Tau	53333.9579	0.0001	I	None	
RW Tri	53256.8545	0.0002	I	None	
ST Tri	53262.8958	0.0002	I	None	Variable GSC 2336-0821 in the same field

Times of minima:					
Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
XY UMa	53405.8661	0.0002	I	None	
XY UMa	53501.6629	0.0002	I	None	
DN UMa	53499.6511	0.0014	II	None	
DN UMa	53550.7037	0.0017	I	None	
VV Vir	53513.6967	0.0003	I	None	
AG Vir	53506.6780	0.0003	I	None	
AK Vir	53515.6819	0.0002	I	None	
CM Vir	53479.9081	0.0006	I	None	
CX Vir	53522.7266	0.0002	I	None	
DL Vir	53499.7582	0.0005	I	None	
DM Vir	53508.7609	0.0002	I	None	
FO Vir	53510.6967	0.0006	I	None	
FQ Vir	53538.7821	0.0002	I	None	Period 0.749604d
GK Vir	53410.9183	0.0005	I	None	
HT Vir	53437.9029	0.0002	II	None	
MR Vir	53554.6963	0.0018	I	None	
MS Vir	53520.7484	0.0002	I	None	
GSC 2336-0821	53262.9265	0.0002	II	None	Period 0.374220d. Variable ST Tri in same field
GSC 3449-0680	53404.8768	0.0003	I	None	
GSC 3449-0688	53404.8790	0.0002	II	None	
GSC 1874-0399	53691.8644	0.0002	I	None	
GSC 1874-0399	53691.9882	0.0004	II	None	
GSC 1874-0399	53693.8707	0.0002	I	None	
GSC 1874-0399	53693.9938	0.0004	II	None	
GSC 1874-0399	53694.8739	0.0002	I	None	
GSC 1874-0399	53694.9977	0.0004	II	None	
GSC 1874-0399	53696.0003	0.0004	II	None	
GSC 1874-0399	53696.8803	0.0002	I	None	
GSC 1874-0399	53700.8936	0.0002	I	None	
GSC 1874-0399	53701.0173	0.0004	II	None	
GSC 1874-0399	53702.8996	0.0002	I	None	
GSC 1874-0399	53703.7766	0.0004	II	None	
GSC 1874-0399	53703.9033	0.0002	I	None	
GSC 1874-0399	53704.7796	0.0004	II	None	
GSC 1874-0399	53704.9062	0.0002	I	None	
GSC 1874-0399	53705.7839	0.0004	II	None	
GSC 1874-0399	53705.9096	0.0002	I	None	
GSC 1874-0399	53706.7864	0.0004	II	None	
GSC 1874-0399	53706.9131	0.0002	I	None	
GSC 1874-0399	53709.7966	0.0004	II	None	
GSC 1874-0399	53709.9229	0.0002	I	None	
GSC 1874-0399	53710.7999	0.0004	II	None	
GSC 1874-0399	53710.9260	0.0002	I	None	
GSC 1874-0399	53711.8032	0.0004	II	None	
GSC 1874-0399	53711.9294	0.0002	I	None	
GSC 1874-0399	53712.8065	0.0004	II	None	
GSC 1874-0399	53712.9325	0.0002	I	None	
GSC 1874-0399	53713.8096	0.0004	II	None	
GSC 1874-0399	53713.9360	0.0002	I	None	
GSC 1874-0399	53719.8307	0.0007	II	None	
GSC 1874-0399	53719.9559	0.0003	I	None	
GSC 1874-0399	53725.5988	0.0004	II	None	
GSC 1874-0399	53725.7241	0.0002	I	None	
GSC 1874-0399	53725.8495	0.0004	II	None	
GSC 1874-0399	53725.9747	0.0002	I	None	
GSC 1874-0399	53729.6121	0.0004	II	None	
GSC 1874-0399	53729.7376	0.0002	I	None	
GSC 1874-0399	53729.8621	0.0004	II	None	

Times of minima:					
Star name	Time of min. HJD 2400000+	Error	Type	Filter	Rem.
GSC 1874-0399	53729.9880	0.0002	I	None	
GSC 1874-0399	53730.6152	0.0004	II	None	
GSC 1874-0399	53730.7404	0.0002	I	None	
GSC 1874-0399	53730.8654	0.0004	II	None	
GSC 1874-0399	53730.9907	0.0002	I	None	
GSC 1874-0399	53731.6184	0.0004	II	None	
Ha0242-2802	53744.5613	0.0002	I	None	Coordinates 02 ^h 42 ^m 35 ^s – 28°02'44''
Ha0242-2802	53744.6360	0.0002	I	None	
Ha0242-2802	53744.7105	0.0005	I	None	
Ha0242-2802	53745.6067	0.0002	I	None	
Ha0242-2802	53745.6813	0.0002	I	None	
SDSS J040714-064425	53740.5981	0.0002	I	None	Coordinates 04 ^h 07 ^m 15 ^s – 06°44'25''
SDSS J040714-064425	53740.7682	0.0002	I	None	
SDSS J040714-064425	53741.6192	0.0002	I	None	
SDSS J040714-064425	53741.7894	0.0002	I	None	
SDSS J040714-064425	53742.6409	0.0002	I	None	
SDSS J040714-064425	53742.8111	0.0002	I	None	
SDSS J040714-064425	53746.5548	0.0002	I	None	
SDSS J040714-064425	53746.7253	0.0002	I	None	
SDSS J040714-064425	53748.5970	0.0002	I	None	
SDSS J040714-064425	53753.7037	0.0002	I	None	
SDSS J040714-064425	53756.5973	0.0002	I	None	

Acknowledgements:

This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France (see references).

References:

Kwee, K. K., & van Woerden, H., 1956, *B.A.N.*, **12**, (464), 327-330
 SIMBAD astronomical database <http://cdsweb.u-strasbg.fr/Simbad.html>

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The remark for ST Tri should read: Variable GSC 2336-0281 in the same field.

The Editors