GEOS **GEOS CIRCULAR ON RR TYPE VARIABLE** **GEOS**
RR 45
Parc de Levesville, 23
July 2010 **F-28300 BAILLEAU L'EVÊQUE**

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LIST OF CCD, PHOTOGRAPHIC AND VISUAL MAXIMA OF RR LYRAE STARS

ABSTRACT

128 instants of maximum light have been determined for 63 RR Lyrae variable stars (56 RRab and 7 RRc) from ccd and photographic measurements or from visual estimates. They are listed with the O-C relative to the most probable cycle number.

RESUME

128 instants de maxima de 63 étoiles variables du type RR Lyrae (56 RRab et 7 RRc) ont été déterminés à partir de mesures ccd ou photographiques et d'estimations visuelles. Ils sont listés avec l'O-C relatif au numéro de cycle le plus vraisemblable.

RIASSUNTO

128 massimi di 63 stelle variabili del tipo RR Lyrae (56 RRab e 7 RRc) sono stati determinati sulla base di misure ccd o fotografiche e di stime visuali. Questi instanti di massimo sono raccolti in una lista con l'O-C relativo al numero di ciclo piú probabile.

RESUMEN

128 instantes de máximos de 63 estrellas variables del tipo RR Lyrae (56 RRab y 7 RRc) han sido determinados a partir de medidas ccd y fotográficas o de estimaciones visuales. Aparecen listados con los O-C relativos al número de ciclo más probable.

OBSERVATIONS

Most of the observations cover a time interval going from September 2009 (JD 2455100) to June 2010 (JD 2455350). The observers are : Robert Cazilhac and Philippe Brizemur (CAZ), Michel Dumont (DMT), Massimiliano Martignoni (MRT), Graham Salmon (SAL) and Jacqueline Vandenbroere (VBR).

OBS.	METHOD	N. MAX.	SITE	INSTRUMENTS
CAZ	n ph	2	France (Ch. Renard)	numeric photo camera (APN) Canon
DMT	vis	5	France (Baîlleau l'Evêque)	binoculars
MRT	vis	11	Italy	T21.5cm
SAL	ccd	20	Great Britain (Dorset)	T25cm at f10 (LX 200)
VBR	vis	97	Belgium (Heure)	N35cm

The times were determined by the observers from their ccd or numerical photographic (n ph) measurements (same proceedings) or from their visual estimates (vis). The O-C are appearing in notes when new or better ephemerides were used and after correction by a non linear relation.

The O-C's curves published in Le Borgne et al. (2007) were examined to avoid any unlikelihood and the O-C relative to linear and non linear ephemerides of this paper were systematically noted LB 2007.

LIST

RRab	OBS.	MODE	HJD	ACCUR	E(GC 85)	O-C (G 85)	NOTES
CI And	VBR	vis	55101.483	0.015	39988	+0.112	
CI And	VBR	vis	55149.470	0.015	40087	+0.111	
GV And	SAL	ccd	55130.378		49948	–0.181	–0.070 (with eph. LB 2007)

RRab	OBS.	MODE	HJD	ACCUR	E (GC 85)	O-C (G 85)	NOTES
BN Aqr	VBR	vis	55120.328	0.010	36724	+0.607	–0.009 (with quadratic elements of LB 2007)
SY Ari	VBR	vis	55155.429	0.010	33617	–0.049	
SY Ari	VBR	vis	55180.358	0.010	33661	–0.054	
BH Aur	VBR	vis	55155.464	0.010	27196	+0.004	+0.012 (with eph. LB 2007)
BH Aur	VBR	vis	55260.366	0.010	27426	+0.005	+0.014 idem
SZ Boo	VBR	vis	55265.528	0.010	52839	+0.022	
SZ Boo	VBR	vis	55309.447	0.010	52923	+0.024	
RZ Cam	VBR	vis	55149.430	0.010	32741	+0.053	
RZ Cam	VBR	vis	55186.435	0.010	32818	+0.063	
SS Cnc	VBR	vis	55179.567	0.010	87388	+0.052	+0.001 (with eph. LB 2007)
SS Cnc	VBR	vis	55263.321	0.010	87616	+0.053	+0.002 idem
SX Cnc	VBR	vis	55262.304	0.015	33734	–0.324	
SX Cnc	VBR	vis	55264.334	0.010	33738	–0.335	
AN Cnc	VBR	vis	55260.360	0.010	30985	+0.157	+0.012 (with quadratic elements of LB 2007)
AQ Cnc	VBR	vis	55179.560	0.010	40433	–0.065	
AQ Cnc	VBR	vis	55262.373	0.015	40584	–0.078	
CQ Cnc	VBR	vis	55264.324	0.015	23617	+0.230	
CQ Cnc	VBR	vis	55265.357	0.015	23619	+0.214	
EZ Cnc	VBR	vis	55263.487	0.015	16765	–0.039	
W CVn	VBR	vis	55298.517	0.015	61433	–0.138	+0.003 (with quadratic elements of LB 2007)
W CVn	VBR	vis	55340.444	0.015	61509	–0.145	–0.003 idem
RX CVn	VBR	vis	55298.563	0.010	29133	–0.045	–0.025 (with eph. LB 2007)
RX CVn	VBR	vis	55303.431	0.010	29142	–0.037	–0.018 idem
RX CVn	VBR	vis	55304.511	0.010	29144	–0.037	–0.018 idem
SV CVn	VBR	vis	55305.562	0.010	22981	+0.069	
SV CVn	VBR	vis	55307.557	0.010	22984	+0.060	
UZ CVn	VBR	vis	55263.506	0.010	41325	+0.247	
IU Cas	VBR	vis	55101.517	0.015	40581	+0.591	
IU Cas	VBR	vis	55120.333	0.010	40610	+0.575	
AQ Cep	VBR	vis	55292.486	0.010	41698	+0.064	
AQ Cep	VBR	vis	55309.423	0.010	41724	+0.064	
EZ Cep	VBR	vis	55180.322	0.015	75327	+0.094	+0.008 (with quadratic elements of LB 2007)
EZ Cep	VBR	vis	55186.370	0.010	75343	+0.078	–0.008 idem
RZ Cet	VBR	vis	55180.298	0.010	41663	–0.169	+0.044 idem
BS Com	VBR	vis	54970.462	0.015	50285	–0.476	
BS Com	VBR	vis	54974.409	0.010	50296	–0.527	
UY CrB	VBR	vis	55310.495	0.010	14510	–0.151	
UY CrB	VBR	vis	55337.434	0.010	14539	–0.158	
XZ Cyg	MRT	vis	49990.466	0.010	12571	–0.859	
XZ Cyg	MRT	vis	50290.485	0.003	13214	–0.929	
XZ Cyg	MRT	vis	50312.411	0.015	13261	–0.938	
BV Del	VBR	vis	55066.400	0.010	69758	+0.026	+0.001 (with eph. LB 2007)
BV Del	VBR	vis	55119.332	0.010	69883	+0.026	+0.001 idem
SU Dra	VBR	vis	55264.630	0.015	17205	+0.057	+0.018 (with quadratic elements of LB 2007)
SU Dra	VBR	vis	55309.529	0.010	17273	+0.047	+0.008 idem
GI Gem	VBR	vis	55244.303	0.010	57465	+0.075	–0.003 (with eph. LB 2007)
AG Her	VBR	vis	55310.468	0.010	42572	+0.023	
AG Her	VBR	vis	55371.523	0.010	42666	+0.030	
DL Her	SAL	ccd	55099.445		28550	+0.041	
V418 Her	VBR	vis	55335.499	0.010	69140	+0.047	
V418 Her	VBR	vis	55337.386	0.015	69145	+0.053	
V418 Her	VBR	vis	55352.435	0.010	69185	+0.052	
V442 Her	VBR	vis	55321.519	0.015	44315	+0.017	

RRab	OBS.	MODE	HJD	ACCUR	E (GC 85)	O-C (G 85)	NOTES
V442 Her	VBR	vis	55333.443	0.015	44342	+0.004	
V1124 Her	VBR	vis	55333.420	0.010	11389	–0.056	
V1124 Her	VBR	vis	55334.487	0.010	11392	–0.054	
SZ Hya	VBR	vis	55260.458	0.015	27141	–0.191	
SZ Hya	VBR	vis	55288.380	0.010	27193	–0.205	
WZ Hya	VBR	vis	55262.492	0.010	29077	–0.010	
DG Hya	VBR	vis	54564.357	0.015	40812	–0.029	
DG Hya	VBR	vis	55292.335	0.010	42505	+0.005	
DG Hya	VBR	vis	55304.366	0.010	42533	–0.004	
RR Leo	VBR	vis	55293.431	0.010	26521	+0.106	+0.007 (with quadratic elements of LB 2007)
RR Leo	VBR	vis	55303.395	0.015	26543	+0.118	+0.019 idem
ST Leo	MRT	vis	49811.453	0.010	45793	–0.000	+0.011 (with eph. LB 2007)
TV Leo	VBR	vis	55305.406	0.010	27144	+0.105	
TV Leo	VBR	vis	55307.420	0.010	27147	+0.100	
TW Lyn	MRT	vis	49765.442	0.003	9843	+0.036	–0.007 (with eph. LB 2007)
RR Lyr	MRT	vis	47396.358	0.010	7891	–0.215	
RR Lyr	MRT	vis	49894.4325	0.010	12298	–0.327	
RR Lyr	DMT	vis	55097.401	0.004	21477	–0.637	
RR Lyr	DMT	vis	55101.365	0.010	21484	–0.641	
RR Lyr	DMT	vis	55118.401	0.010	21514	–0.611	
RR Lyr	DMT	vis	55131.427	0.014	21537	–0.623	
RR Lyr	DMT	vis	55352.497	0.008	21927	–0.632	
AQ Lyr	VBR	vis	55083.369	0.010	54287	+0.082	
AQ Lyr	VBR	vis	55127.289	0.010	54410	+0.073	
KR Lyr	MRT	vis	50287.381	0.004	50731	+0.010	
V455 Oph	MRT	vis	50287.470	0.003	18625	–0.004	
V964 Ori	VBR	vis	55244.303	0.015	47051	–0.409	+0.015 (with quadratic elements of LB 2007)
AE Peg	VBR	vis	55067.392	0.010	31522	–0.101	
AE Peg	VBR	vis	55155.293	0.015	31699	–0.117	
BF Peg	VBR	vis	55097.526	0.015	24477	–0.031	–0.084 (with eph. LB 2007)
BF Peg	VBR	vis	55119.359	0.015	24521	–0.014	–0.066 idem
GY Peg	VBR	vis	54683.537	0.010	26748	–0.233	+0.021 (with eph. RR 41)
GY Peg	VBR	vis	55047.503	0.015	27471	–0.264	–0.003 idem
GY Peg	VBR	vis	55102.397	0.015	27580	–0.246	+0.015 idem
V460 Per	CAZ	n ph	54749.549	0.002	29818	+0.038	
V460 Per	CAZ	n ph	54750.626	0.002	29820	+0.035	
RV Sex	VBR	vis	55272.453	0.010	50916	+0.057	
BO Tau	VBR	vis	55232.338	0.010	37136	+0.174	
BO Tau	VBR	vis	55244.337	0.015	37163	+0.154	
AX UMa	VBR	vis	55265.369	0.010	18476	–0.187	
AX UMa	VBR	vis	55304.419	0.010	18549	–0.186	
BF UMa	VBR	vis	55267.378	0.010	29883	+0.087	
BF UMa	VBR	vis	55278.389	0.010	29905	+0.075	
AD Vir	VBR	vis	55321.401	0.015	33371	+0.146	
AD Vir	VBR	vis	55332.428	0.015	33391	+0.129	
AF Vir	VBR	vis	54995.424	0.015	30308	–0.145	
AF Vir	VBR	vis	55305.515	0.010	30949	–0.144	
AR Vir	VBR	vis	55325.444	0.010	21335	+0.062	
AR Vir	VBR	vis	55334.464	0.010	21352	+0.067	
OQ Vir	VBR	vis	55272.519	0.015	6194	–0.020	eph. Wils et al., 2006
OQ Vir	VBR	vis	55304.532	0.015	6247	–0.014	idem
OQ Vir	VBR	vis	55307.537	0.015	6252	–0.028	idem

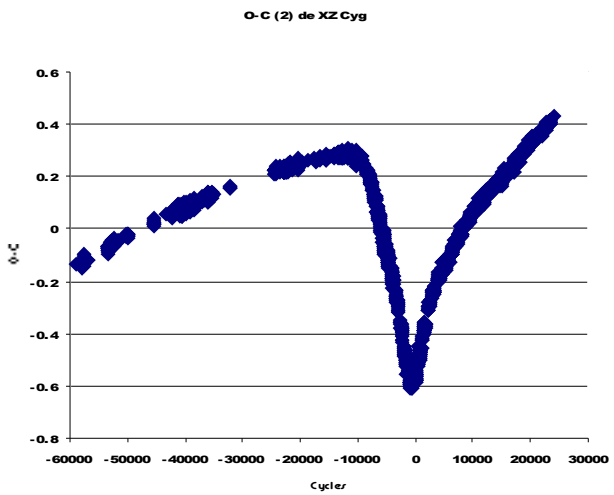
RRC	OBS.	MODE	HJD	ACCUR	E(GC 85)	O-C (G85)	NOTES
RW Ari	SAL	ccd	55239.359		33389	–0.137	E value dubious
CQ Boo	SAL	ccd	54984.500		14318	–0.057	eph. A Paschke (1)
CQ Boo	SAL	ccd	54986.472		14325	–0.058	idem
CQ Boo	SAL	ccd	54993.522		14350	–0.055	idem
UY Cam	VBR	vis	55180.486	0.015	73454	–0.081	
UY Cam	VBR	vis	55254.458	0.010	73731	–0.080	
RZ Cep	MRT	vis	47322.431	0.010	15185	–0.329	
RZ Cep	MRT	vis	47350.514	0.010	15276	–0.337	
RZ Cep	SAL	ccd	54801.484		39415	–0.721	
RZ Cep	SAL	ccd	55118.486		40442	–0.739	
RZ Cep	SAL	ccd	55144.416		40526	–0.738	
RZ Cep	SAL	ccd	55178.371		40636	–0.739	
RZ Cep	SAL	ccd	55179.294		40639	–0.742	
RZ Cep	SAL	ccd	55183.298		40652	–0.751	
RU Sex	VBR	vis	55272.464	0.010	36136	+0.045	
RU Sex	VBR	vis	55305.386	0.010	36230	+0.045	
SX UMa	SAL	ccd	55256.372		33040	–0.133	
BH UMa	VBR	vis	55258.514	0.020	6311	+0.112	eph. IBVS 5599 (2)
BH UMa	VBR	vis	55265.502	0.015	6331	+0.113	idem

(1) CQ Boo, elements of : HJD 50948.5485 + 0.2818835208 (A. Paschke)
(2) BH UMa, IBVS 5599 : type RRc, HDJ 53053.6545 + 0.349350

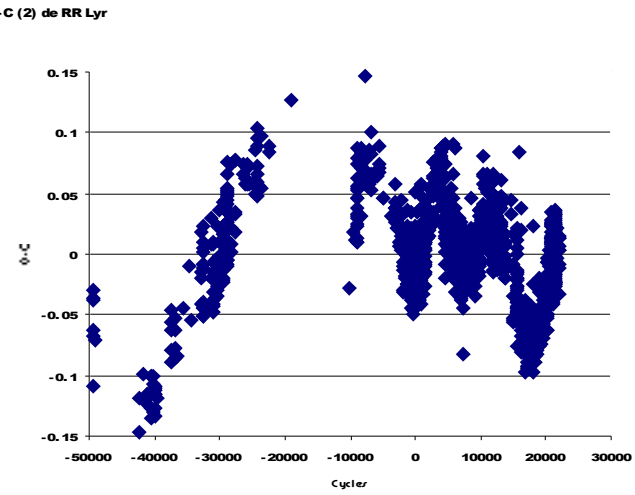
REMARKS ON INDIVIDUAL STARS

XZ Cyg, RR Lyr and RZ Cep are RR Lyrae stars with variable periods. For those stars, we find, in the GCVS, different ephemerides corresponding to different laps of time, any ephemeris being valuable for all the maxima. It explains the large O-C's which are not clearly showing the evolution of the period of each star. A solution is to gather all the times of maximum and to make a linear regression with them, taking care to correctly number the maxima. Afterwards, the graph clearly shows the evolution of the period. I use to add regularly the new times of maximum in my files of regression. The actual ephemerides are HJD 2444125.0102 + 0.46657380 for XZ Cyg, HJD 2442923.4499 + 0.56683696 for RR Lyr and HJD 2442635.5235 + 0.30866513 for RZ Cep. The graphs of the O-C's are showed in Fig. 1 with the times published in this paper included.

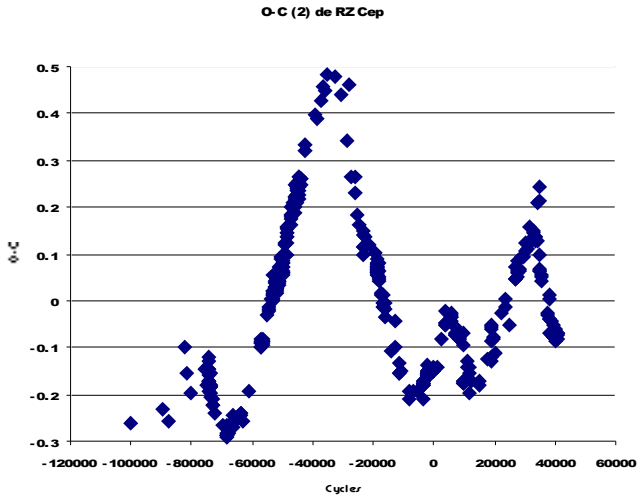
Fig. 1 : O-C's curves for 3 RR Lyrae stars



XZ Cyg (RRab)



RR Lyr (RRab)



RZ Cep (RRc)

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