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

Number 5568

Konkoly Observatory
Budapest
5 October 2004

HU ISSN 0374 – 0676

THE GEOS RR Lyr SURVEY

Maxima of RR Lyr stars observed by the automated telescope TAROT

(GEOS Circular RR 21)

LE BORGNE, J.F.[1,2]; KLOTZ, A.[3]; BOËR, M.[4]

[1] GEOS (Groupe Européen d'Observations Stellaires), 23 Parc de Levesville, 28300 Bailleau l'Evêque, France,

[2] Laboratoire d'Astrophysique, Observatoire Midi-Pyrénées, Toulouse, France

[3] Centre d'Etude Spatiale des Rayonnements, Observatoire Midi-Pyrénées, Toulouse, France

[4] Observatoire de Haute-Provence, France

A GEOS program (`http://www.upv.es/geos/`) (Boninsegna et al., 2002) of automated observations of RR Lyr stars has started in January 2004, using the telescope TAROT (`http://tarot.obs-hp.fr`) located in Calern Observatory (Observatoire de la Côte d'Azur, Nice University, France). The aim of this survey is to monitor maxima of light of RR Lyr stars in order to feed the GEOS RR Lyr web database (`http://webast.ast.obs-mip.fr/people/leborgne/dbRR`). This is a legacy project for the study of period variations of RR Lyr stars.

TAROT is a 25cm automatic telescope designed for observations of gamma ray burst (GRB) afterglows in the visible. It is automatically triggered by gamma ray satellites (Boër et al., 2001, Bringer et al., 1999). While waiting for GRB triggering, TAROT may be used for other photometric programs: the GEOS RR Lyr survey is one of them. TAROT images are obtained by a 2048×2048 Marconi 42-40 thin back illuminated CCD. Field of view is $1\overset{\circ}{.}86 \times 1\overset{\circ}{.}86$. Data reduction, from bias subtraction and flatfielding to photometry using SExtractor, is performed automatically.

We present here the first list of light maxima of RR Lyrae stars observed with no filter between January and June 2004 (Table 1). Maxima are determined by fitting a polynomial function on the data points. The uncertainties on individual maxima are estimated from the data sampling of each maximum. The nominal sampling (twin measures within 1 minute in every 10 minutes at foreseen maximum time) may be altered by local events (weather or telescope operation). This results uncertainties from 0.002 to 0.010 day. For a well observed star, the mean uncertainty on maxima is about 0.003 day (4.3 minutes). All $O-C$'s are computed with the GCVS elements (Kholopov et al. 1985) and are displayed in table 2 in column "$O-C$ (1)". "$O-C$ (2)" are computed with elements which allow more precise predictions for scheduling observations from the BAV web site `http://www.var-mo.de` when available.

Table 1: maxima of RR Lyrae stars

Variable	Maximum HJD 24...	$O-C$ (1) (days)	E (1)	$O-C$ (2) (days)	E (2)	ref (2)
SW And	53040.306±0.005	0.166	78926	−0.005	10134	1
SW And	53044.293±0.005	0.173	78935	0.001	10143	1
SW And	53047.384±0.002	0.168	78942	−0.003	10150	1
XX And	53042.449±0.003	0.210	19308	0.006	2582	1
XX And	53045.341±0.004	0.211	19312	0.007	2586	1
X Ari	53054.333±0.003	0.266	23759	0.014	2901	1
TZ Aur	53034.598±0.005	0.018	84591			
RS Boo	53043.496±0.006	0.005	29875			
RS Boo	53049.534±0.002	0.005	29891			
RS Boo	53050.666±0.003	0.005	29893			
RS Boo	53132.541±0.002	−0.002	30110			
RS Boo	53175.558±0.005	−0.002	30225			
ST Boo	53122.562±0.003	0.097	54542	0.015	2936	2
ST Boo	53132.516±0.002	0.095	54558	0.012	2952	2
TW Boo	53037.546±0.010	−0.044	49122	−0.006	8524	2
TW Boo	53039.673±0.003	−0.046	49126	−0.009	8528	2
TW Boo	53044.465±0.007	−0.044	49135	−0.007	8537	2
TW Boo	53047.666±0.002	−0.037	49141	0.000	8543	2
SS Cnc	53034.302±0.005	0.040	81548	−0.007	81548	1
TT Cnc	53046.343±0.004	0.087	23253	0.015	6039	2
TT Cnc	53047.435±0.003	0.052	23255	−0.020	6041	2
TT Cnc	53048.596±0.005	0.086	23257	0.015	6043	2
W CVn	53038.519±0.005	−0.130	57337	0.000	9140	2
W CVn	53039.634±0.005	−0.118	57339	0.011	9142	2
W CVn	53048.461±0.010	−0.120	57355	0.010	9158	2
W CVn	53050.664±0.002	−0.124	57359	0.006	9162	2
W CVn	53055.624±0.005	−0.129	57368	0.000	9171	2
UZ CVn	53162.465±0.010	0.230	38314	−0.023	2690	2
V363 Cas	53047.402±0.010	−0.073	30931	−0.013	6211	2
ST Com	53132.548±0.002	−0.034	16543	−0.002	13391	2
ST Com	53147.519±0.005	−0.037	16568	−0.004	13416	2
TV CrB	53119.505±0.003	0.016	36778	−0.009	4993	2
UY Cyg	53166.568±0.003	0.051	54811	0.005	25193	2
DX Del	53181.507±0.004	0.053	29229	0.000	29229	1
XZ Dra	53038.304±0.005	−0.074	23316	−0.024	15043	2
XZ Dra	53041.644±0.005	−0.070	23323	−0.020	15049	2
XZ Dra	53042.602±0.010	−0.065	23325	−0.015	15052	2
XZ Dra	53043.546±0.003	−0.074	23327	−0.024	15054	2
GI Gem	53034.650±0.010	0.075	52365	0.001	52365	1
TW Her	53181.566±0.004	−0.008	79170			
VX Her	53168.554±0.006	0.079	68994	−0.023	3189	1
AR Her	53044.608±0.003	−0.159	24659	0.024	6696	2

ref.: 1 `http://www.var-mo.de/rr-lyrae-sektion.htm`
2 `http://www.var-mo.de/st-daten.htm`

Table 1 (cont.): maxima of RR Lyrae stars

Variable	Maximum HJD 24...	$O-C$ (1) (days)	E (1)	$O-C$ (2) (days)	E (2)	ref (2)
RR Leo	53046.346±0.003	0.059	21554	0.017	4005	1
RR Leo	53047.699±0.003	0.055	21557	0.013	4008	1
RR Leo	53048.604±0.002	0.055	21559	0.013	4010	1
RR Leo	53049.515±0.003	0.061	21561	0.019	4012	1
RR Leo	53050.420±0.005	0.061	21563	0.019	4014	1
RR Leo	53051.322±0.002	0.058	21565	0.017	4016	1
RR Leo	53101.540±0.004	0.061	21676	0.019	4127	1
SS Leo	53050.565±0.003	−0.027	17992			
TT Lyn	53048.520±0.010	−0.019	27446			
CN Lyr	53131.553±0.010	0.020	21015			
CN Lyr	53145.536±0.006	0.016	21049			
CN Lyr	53154.584±0.010	0.013	21071			
CN Lyr	53168.572±0.004	0.014	21105			
AR Per	53040.552±0.002	0.050	60635	0.003	3015	1
AR Per	53041.401±0.002	0.048	60638	0.001	3017	1
AR Per	53043.529±0.002	0.048	60643	0.002	3022	1
AR Per	53044.379±0.002	0.047	60645	0.000	3024	1
AR Per	53046.508±0.002	0.048	60650	0.002	3029	1
AR Per	53047.365±0.004	0.054	60652	0.008	3030	1
AR Per	53101.409±0.004	0.053	60779	0.007	3158	1
AN Ser	53089.562±0.001	−0.005	73516			
AN Ser	53123.498±0.002	−0.004	73581			
RV UMa	53039.643±0.002	0.091	17015	0.003	3797	2
RV UMa	53040.586±0.004	0.098	17017	0.010	3799	2
RV UMa	53041.508±0.002	0.084	17019	−0.004	3801	2
RV UMa	53042.458±0.002	0.098	17021	0.010	3803	2
RV UMa	53047.601±0.002	0.092	17032	0.004	3814	2
TU UMa	53039.403±0.005	−0.034	18305	0.016	18305	1
TU UMa	53049.440±0.010	−0.035	18323	0.015	18323	1
TU UMa	53050.549±0.003	−0.041	18325	0.009	18325	1
TU UMa	53054.453±0.002	−0.041	18332	0.009	18332	1
BN Vul	53155.518±0.010	0.065	12834	0.010	2991	1

ref.: 1 `http://www.var-mo.de/rr-lyrae-sektion.htm`
2 `http://www.var-mo.de/st-daten.htm`

References:

Boër, M., Atteia, J. L., Bringer, M., Gendre, B., Klotz, A., Malina, R., de Freitas Pacheco, J. A., Pedersen, H., 2001, *A&A*, **378**, 76

Boninsegna, R., Vandenbroere, J., Le Borgne, J. F., The Geos Team 2002, ASP Conf. Ser. 259, IAU Colloq. 185, *"Radial and Nonradial Pulsations as Probes of Stellar Physics"*, p.166.

Bringer, M., Boër, M., Peignot, C., Fontan, G., Merce, C., 1999, *A&AS*, **138**, 581

Kholopov, P. N., et al. 1985, *General Catalogue of Variable Stars*, Moscow: Nauka Publishing House, 1988, 4th ed., edited by Khopolov, P.N.; and 2003 web edition (`http://www.sai.msu.su/groups/cluster/gcvs/`).