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THE GEOS RR Lyr SURVEY

Eighth List of Maxima of RR Lyr Stars Observed by the Automated Telescopes TAROT

(GEOS Circular RR 33)

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We present here the eighth list of light maxima of RR Lyrae stars from the GEOS RR Lyr Survey (Le Borgne et al., 2007), a GEOS program (<http://www.upv.es/geos/>) (Boninsegna et al., 2002) of automated observations of RR Lyr stars started in January 2004.

We are using the 25-cm automatic telescopes TAROT (<http://tarot.obs-hp.fr>) (Boër et al., 2001; Bringer et al., 1999). One of the telescopes is located in the northern hemisphere in Calern Observatory (Observatoire de la Côte d’Azur, Nice University, France). A second identical telescope in the southern hemisphere is located in ESO La Silla Observatory, Chile. Images are obtained by 2048 × 2048 Marconi 42-40 thin back illuminated CCDs. Field of view of both telescopes is 1.86° × 1.86°. Data reduction, from bias subtraction and flatfielding to photometry using SExtractor (Bertin & Arnouts, 1996), is performed automatically. The aim of this legacy project for the study of period variations of RR Lyr stars is to monitor maxima of light of these stars in order to feed the GEOS RR Lyr web database (<http://dbRR.ast.obs-mip.fr>).

The present list contains 727 maxima observed with no filter mainly between July and December 2007 (Table 1). The 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 (two consecutive 30-s exposures taken every 10 minutes on a time baseline of 2 hours centered around the predicted 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). The $O - C$ ’s are computed with the GCVS elements (Kholopov et al., 1985) and are displayed in Table 1 in column ‘ $O - C$ ’. The column ‘ E ’ contains the cycle number. Note that this cycle number takes into account the shifts induced by the elements when the period of the elements is very different from the actual one, the absolute value of $O - C$ becoming greater than 1 period. When no elements are available in the GCVS, the reference of the elements, if exists, is given as a footnote of Table 1. The fifth column in Table 1 gives the abbreviation of the name of the observatory where the star was observed.

Table 1: maxima of RR Lyrae stars

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
SW And	54310.482±0.003	-0.769	81800.	C	TY Aps	54326.607±0.002	0.048	29102.	LS
SW And	54321.542±0.005	-0.766	81825.	C	TY Aps	54330.620±0.002	0.047	29110.	LS
SW And	54357.363±0.002	-0.769	81906.	C	VX Aps	54325.599±0.002	-0.005	41451.	LS
SW And	54376.380±0.002	-0.770	81949.	C	VX Aps	54339.657±0.003	0.001	41480.	LS
SW And	54390.533±0.002	-0.770	81981.	C	XZ Aps	54292.580±0.003	-0.214	43541.	LS
SW And	54413.531±0.002	-0.771	82033.	C	XZ Aps	54329.576±0.002	-0.226	43604.	LS
SW And	54433.433±0.003	-0.771	82078.	C	BS Aps	54292.505±0.003	0.003	28963.	LS
SW And	54438.297±0.002	-0.773	82089.	C	BS Aps	54317.582±0.005	0.030	29006.	LS
SW And	54449.354±0.003	-0.773	82114.	C	CK Aps	54283.571±0.002	-0.178	28217.	LS
XX And	54340.521±0.002	0.228	21104.	C	CK Aps	54284.818±0.002	-0.178	28219.	LS
XX And	54351.366±0.003	0.232	21119.	C	DD Aps	54317.550±0.003	0.082	27140.	LS
XX And	54358.589±0.003	0.228	21129.	C	DI Aps	54283.704±0.002	-0.024	35116.	LS
XX And	54366.542±0.005	0.230	21140.	C	DI Aps	54319.529±0.003	-0.027	35185.	LS
XX And	54379.550±0.005	0.229	21158.	C	EL Aps	54283.789±0.003	-0.174	45355.	LS
XX And	54385.332±0.003	0.229	21166.	C	EL Aps	54322.643±0.005	-0.161	45422.	LS
XX And	54395.451±0.003	0.230	21180.	C	EX Aps	54286.849±0.004	0.013	55857.	LS
XX And	54405.567±0.003	0.227	21194.	C	EX Aps	54341.579±0.005	0.015	55973.	LS
XX And	54408.461±0.003	0.230	21198.	C	EX Aps	54367.529±0.005	0.016	56028.	LS
XX And	54419.305±0.003	0.233	21213.	C	LU Aps	54283.863±0.005	0.196	22500.	LS
XX And	54432.310±0.002	0.228	21231.	C	SW Aqr	54316.408±0.003	0.000	63616.	C
XX And	54434.488±0.005	0.238	21234.	C	SW Aqr	54343.510±0.005	0.003	63675.	C
XX And	54437.368±0.007	0.227	21238.	C	SW Aqr	54349.480±0.004	0.002	63688.	C
AT And	54300.456±0.005	-0.006	19382.	C	SW Aqr	54355.449±0.002	0.000	63701.	C
AT And	54337.480±0.005	0.003	19442.	C	SW Aqr	54356.370±0.005	0.002	63703.	C
AT And	54366.465±0.002	-0.007	19489.	C	SW Aqr	54372.439±0.002	-0.004	63738.	C
AT And	54368.324±0.005	0.001	19492.	C	SX Aqr	54356.388±0.005	-0.114	27179.	C
AT And	54387.442±0.004	-0.005	19523.	C	SX Aqr	54359.604±0.003	-0.113	27185.	LS
AT And	54405.335±0.005	-0.003	19552.	C	SX Aqr	54371.393±0.003	-0.109	27207.	C
AT And	54406.570±0.006	-0.002	19554.	C	SX Aqr	54401.389±0.002	-0.113	27263.	C
AT And	54408.426±0.003	0.004	19557.	C	TZ Aqr	54317.470±0.005	0.019	29357.	C
AT And	54411.506±0.004	-0.001	19562.	C	TZ Aqr	54319.748±0.003	0.012	29361.	LS
AT And	54432.477±0.003	-0.005	19596.	C	TZ Aqr	54327.742±0.002	0.009	29375.	LS
AT And	54447.286±0.004	-0.002	19620.	C	TZ Aqr	54329.459±0.002	0.013	29378.	C
CI And	54337.563±0.005	0.108	38412.	C	TZ Aqr	54345.449±0.005	0.009	29406.	C
CI And	54339.502±0.002	0.108	38416.	C	TZ Aqr	54378.582±0.005	0.013	29464.	LS
CI And	54340.469±0.002	0.106	38418.	C	WZ Aqr	54289.817±0.004	0.068	67878.	LS
CI And	54342.412±0.003	0.110	38422.	C	WZ Aqr	54351.602±0.004	0.071	68003.	LS
CI And	54354.526±0.002	0.106	38447.	C	YZ Aqr	54358.666±0.002	0.053	34414.	LS
CI And	54356.464±0.003	0.105	38451.	C	AA Aqr	54325.712±0.003	-0.118	55145.	LS
CI And	54386.516±0.002	0.104	38513.	C	AA Aqr	54328.757±0.003	-0.117	55150.	LS
CI And	54407.356±0.003	0.102	38556.	C	AA Aqr	54361.636±0.004	-0.118	55204.	LS
CI And	54416.565±0.003	0.101	38575.	C	AA Aqr	54383.555±0.002	-0.119	55240.	LS
CI And	54422.3826±0.0018	0.1018	38587.	C	BN Aqr	54299.801±0.002	0.554	34977.	LS
CI And	54423.348±0.003	0.098	38589.	C	BN Aqr	54330.801±0.002	0.558	35043.	LS
CI And	54432.558±0.002	0.098	38608.	C	BN Aqr	54344.420±0.003	0.557	35072.	C
CI And	54435.466±0.002	0.098	38614.	C	BN Aqr	54347.709±0.006	0.558	35079.	LS
CI And	54438.373±0.003	0.097	38620.	C	BN Aqr	54375.420±0.002	0.560	35138.	C
DR And	54351.476±0.002	-0.019	30422.	C	BN Aqr	54380.586±0.005	0.560	35149.	LS
DR And	54368.360±0.003	-0.028	30452.	C	BO Aqr	54326.792±0.002	0.141	18307.	LS
DR And	54378.509±0.002	-0.015	30470.	C	BO Aqr	54358.716±0.003	0.141	18353.	LS
DR And	54396.535±0.002	-0.009	30502.	C	BR Aqr	54328.816±0.002	-0.156	34641.	LS
DR And	54405.540±0.003	-0.014	30518.	C	BR Aqr	54329.780±0.002	-0.156	34643.	LS
DR And	54412.290±0.003	-0.022	30530.	C	BR Aqr	54349.539±0.002	-0.154	34684.	C
DR And	54430.313±0.005	-0.018	30562.	C	BR Aqr	54350.499±0.002	-0.158	34686.	C
DR And	54431.449±0.010	-0.009	30564.	C	BR Aqr	54378.455±0.004	-0.151	34744.	C
DR And	54448.3436±0.0015	-0.0075	30594.	C	BR Aqr	54401.589±0.005	-0.147	34792.	LS
TY Aps	54298.501±0.005	0.037	29046.	LS	CP Aqr	54307.463±0.002	-0.110	35440.	C
TY Aps	54319.582±0.002	0.046	29088.	LS	CP Aqr	54326.465±0.002	-0.108	35481.	C

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
CP Aqr	54327.389±0.004	-0.111	35483.	C	AH Cam	54395.464±0.005	-0.421	42487.	C
CP Aqr	54333.416±0.004	-0.108	35496.	C	AH Cam	54419.427±0.003	-0.426	42552.	C
CP Aqr	54352.413±0.002	-0.111	35537.	C	AH Cam	54433.466±0.006	-0.399	42590.	C
CP Aqr	54358.438±0.003	-0.110	35550.	C	AH Cam	54434.571±0.002	-0.400	42593.	C
CP Aqr	54371.420±0.005	-0.103	35578.	C	AH Cam	54436.4042±0.0014	-0.4103	42598.	C
CP Aqr	54372.340±0.002	-0.110	35580.	C	AH Cam	54441.565±0.005	-0.412	42612.	C
DN Aqr	54328.752±0.003	0.045	40873.	LS	AH Cam	54453.362±0.005	-0.414	42644.	C
DN Aqr	54335.724±0.006	0.045	40884.	LS	RW Cnc	54419.542±0.003	0.209	27162.	C
FX Aqr	54320.756±0.003	0.120	15449.	LS	SS Cnc	54419.544±0.0014	0.051	85319.	C
GP Aqr	54328.693±0.003			LS	SS Cnc	54448.5627±0.0010	0.0500	85398.	C
GP Aqr	54352.580±0.010			LS	TT Cnc	54442.589±0.003	0.105	25731.	C
GP Aqr	54383.390±0.008			C	AN Cnc	54420.624±0.003	0.143	29439.	C
HH Aqr	54336.635±0.005			LS	AN Cnc	54438.5495±0.0019	0.1445	29472.	C
AA Aql	54323.643±0.003	0.033	82856.	LS	AS Cnc	54414.595±0.005	0.349	24637.	C
AA Aql	54325.456±0.003	0.037	82861.	C	AS Cnc	54417.687±0.003	0.353	24642.	C
AA Aql	54362.356±0.005	0.034	82963.	C	AS Cnc	54445.473±0.005	0.351	24687.	C
V341 Aql	54288.447±0.003	0.031	22650.	C	AS Cnc	54453.503±0.003	0.353	24700.	C
V341 Aql	54292.493±0.005	0.031	22657.	C	EZ Cnc ¹	54447.534±0.003	-0.031	13364.	C
V341 Aql	54330.639±0.002	0.027	22723.	LS	EZ Cnc ¹	54454.626±0.002	-0.034	13377.	C
V341 Aql	54354.341±0.003	0.030	22764.	C	AA CMi	54451.467±0.002	0.055	37527.	C
V341 Aql	54358.386±0.005	0.029	22771.	C	AA CMi	54465.756±0.003	0.054	37557.	LS
S Ara	54327.692±0.004	0.174	29156.	LS	BB CMi	53754.541±0.010	0.112	70909.	C
CZ Ara	54286.700±0.005	-0.156	37518.	LS	BB CMi	53758.505±0.010	0.111	70919.	C
CZ Ara	54320.545±0.003	-0.159	37565.	LS	IU Car	54410.691±0.005	0.266	17249.	LS
X Ari	54386.636±0.002	0.331	25805.	C	IU Car	54432.810±0.003	0.271	17279.	LS
X Ari	54394.452±0.005	0.333	25817.	C	IU Cas	54321.558±0.002	-0.107	39381.	C
X Ari	54396.406±0.003	0.334	25820.	C	IU Cas	54377.405±0.005	-0.107	39467.	C
X Ari	54407.478±0.005	0.337	25837.	C	IU Cas	54386.500±0.003	-0.104	39481.	C
X Ari	54411.383±0.002	0.335	25843.	C	IU Cas	54397.539±0.003	-0.104	39498.	C
X Ari	54416.593±0.005	0.336	25851.	C	IU Cas	54401.435±0.003	-0.105	39504.	C
X Ari	54431.569±0.003	0.335	25874.	C	IU Cas	54412.474±0.003	-0.105	39521.	C
X Ari	54435.476±0.002	0.336	25880.	C	IU Cas	54418.319±0.007	-0.105	39530.	C
X Ari	54450.453±0.004	0.336	25903.	C	IU Cas	54429.362±0.003	-0.101	39547.	C
TZ Aur	54383.520±0.002	0.013	88035.	C	IU Cas	54438.449±0.003	-0.105	39561.	C
TZ Aur	54408.586±0.002	0.012	88099.	C	V363 Cas	54338.388±0.005	0.543	33292.	C
TZ Aur	54447.362±0.002	0.012	88198.	C	V363 Cas	54339.481±0.003	0.543	33294.	C
BH Aur	54370.527±0.002	-0.003	25475.	C	V363 Cas	54350.420±0.005	0.551	33314.	C
BH Aur	54385.581±0.005	0.000	25508.	C	V363 Cas	54358.624±0.010	0.557	33329.	C
BH Aur	54397.436±0.002	-0.003	25534.	C	V363 Cas	54370.628±0.005	0.537	33351.	C
BH Aur	54408.386±0.002	0.001	25558.	C	V363 Cas	54374.478±0.005	0.561	33358.	C
BH Aur	54411.577±0.002	-0.001	25565.	C	V363 Cas	54385.410±0.004	0.563	33378.	C
BH Aur	54452.621±0.004	-0.005	25655.	C	V363 Cas	54387.592±0.004	0.559	33382.	C
ST Boo	54287.489±0.005	0.096	56414.	C	V363 Cas	54396.345±0.005	0.567	33398.	C
ST Boo	54292.467±0.002	0.096	56422.	C	V363 Cas	54402.339±0.005	0.549	33409.	C
U Cae	54427.653±0.002	-0.107	47912.	LS	V363 Cas	54415.447±0.010	0.540	33433.	C
U Cae	54432.696±0.002	-0.102	47924.	LS	V363 Cas	54416.560±0.005	0.560	33435.	C
U Cae	54440.6681±0.0018	-0.1056	47943.	LS	V363 Cas	54432.398±0.005	0.549	33464.	C
U Cae	54443.604±0.002	-0.108	47950.	LS	AQ Cep	54102.291±0.002	0.062	39871.	C
U Cae	54445.7019±0.0015	-0.1094	47955.	LS	RR Cet	54011.768±0.002	0.006	37666.	LS
U Cae	54448.6388±0.0015	-0.1110	47962.	LS	RR Cet	54021.722±0.002	0.006	37684.	LS
U Cae	54450.7393±0.0010	-0.1095	47967.	LS	RR Cet	54026.699±0.002	0.005	37693.	LS
U Cae	54453.682±0.002	-0.105	47974.	LS	RR Cet	54031.677±0.002	0.006	37702.	LS
U Cae	54463.758±0.003	-0.104	47998.	LS	RR Cet	54036.653±0.002	0.005	37711.	LS
U Cae	54464.5965±0.0016	-0.1055	48000.	LS	RR Cet	54047.715±0.002	0.006	37731.	LS
U Cae	54466.6925±0.0015	-0.1085	48005.	LS	RR Cet	54051.587±0.002	0.007	37738.	LS
AH Cam	54370.415±0.003	-0.396	42419.	C	RR Cet	54358.518±0.002	0.007	38293.	C
AH Cam	54378.529±0.003	-0.394	42441.	C	RR Cet	54379.533±0.003	0.007	38331.	C
AH Cam	54387.346±0.005	-0.427	42465.	C	RR Cet	54381.744±0.003	0.006	38335.	LS

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
RR Cet	54412.714±0.003	0.007	38391.	LS	DM Cyg	54299.500±0.002	0.061	27907.	C
RR Cet	54419.353±0.004	0.009	38403.	C	DM Cyg	54328.469±0.002	0.060	27976.	C
RR Cet	54435.388±0.002	0.007	38432.	C	DM Cyg	54339.386±0.002	0.060	28002.	C
RR Cet	54440.364±0.003	0.005	38441.	C	DM Cyg	54344.422±0.002	0.058	28014.	C
RU Cet	54402.581±0.003	0.077	24862.	LS	DM Cyg	54365.414±0.002	0.057	28064.	C
RU Cet	54416.657±0.005	0.082	24886.	LS	DM Cyg	54394.3871±0.0015	0.0597	28133.	C
RU Cet	54419.586±0.006	0.080	24891.	LS	DM Cyg	54402.365±0.003	0.060	28152.	C
RX Cet	54351.853±0.006	0.218	24797.	LS	DM Cyg	54415.390±0.005	0.070	28183.	C
RX Cet	54374.807±0.004	0.225	24837.	LS	DU Del	53215.575±0.005	-0.273	42576.	C
RX Cet	54416.688±0.005	0.226	24910.	LS	DX Del	54296.417±0.005	0.060	31588.	C
RZ Cet	54379.680±0.010	-0.150	40095.	LS	DX Del	54330.441±0.002	0.055	31660.	C
RZ Cet	54394.495±0.004	-0.142	40124.	C	DX Del	54374.396±0.002	0.057	31753.	C
RZ Cet	54435.343±0.002	-0.143	40204.	C	DX Del	54375.341±0.005	0.057	31755.	C
RZ Cet	54436.3625±0.0016	-0.1449	40206.	C	DX Del	54400.387±0.003	0.054	31808.	C
UU Cet	54330.707±0.004	-0.129	21651.	LS	DX Del	54401.335±0.002	0.057	31810.	C
UU Cet	54375.552±0.005	-0.134	21725.	LS	VW Dor	54406.664±0.005	-0.083	28088.	LS
UU Cet	54401.621±0.010	-0.126	21768.	LS	VW Dor	54407.801±0.003	-0.087	28090.	LS
UU Cet	54415.555±0.003	-0.132	21791.	LS	RW Dra	54287.477±0.002	0.171	33663.	C
RW Col	54420.804±0.005	-0.243	50285.	LS	RW Dra	54291.454±0.002	0.162	33672.	C
RW Col	54426.803±0.004	-0.065	50296.	LS	XZ Dra	54311.474±0.002	-0.104	25988.	C
RW Col	54431.712±0.006	0.081	50305.	LS	XZ Dra	54312.423±0.002	-0.108	25990.	C
RW Col	54443.708±0.003	-0.096	50328.	LS	XZ Dra	54339.580±0.004	-0.111	26047.	C
RX Col	54402.718±0.005	-0.033	43078.	LS	XZ Dra	54342.436±0.003	-0.114	26053.	C
RX Col	54427.658±0.005	-0.043	43120.	LS	XZ Dra	54350.539±0.005	-0.112	26070.	C
RX Col	54456.765±0.006	-0.044	43169.	LS	BC Dra	53440.587±0.010	0.081	15512.	C
RX Col	54465.667±0.003	-0.053	43184.	LS	BC Dra	53525.496±0.010	0.080	15630.	C
RY Col	54379.776±0.010	-0.169	41911.	LS	BC Dra	53941.410±0.010	0.079	16208.	C
RY Col	54402.787±0.004	-0.143	41959.	LS	BC Dra	53961.557±0.010	0.078	16236.	C
RY Col	54425.763±0.003	-0.152	42007.	LS	BC Dra	54295.450±0.005	0.088	16700.	C
RY Col	54440.596±0.002	-0.164	42038.	LS	BC Dra	54344.382±0.005	0.089	16768.	C
S Com	54454.674±0.003	-0.100	23526.	C	BC Dra	54372.455±0.014	0.098	16807.	C
WW CrA	54328.607±0.004	-0.035	41184.	LS	BC Dra	54400.502±0.006	0.082	16846.	C
V413 CrA	54286.712±0.005	0.044	21696.	LS	BC Dra	54411.296±0.008	0.082	16861.	C
V592 CrA	54340.610±0.005	0.195	39311.	LS	BC Dra	54452.314±0.004	0.084	16918.	C
SW Cru	54283.510±0.005	0.069	86195.	LS	BD Dra	54328.473±0.002	0.745	21311.	C
UY Cyg	54301.439±0.005	0.056	56835.	C	BD Dra	54331.410±0.002	0.737	21316.	C
UY Cyg	54311.530±0.002	0.054	56853.	C	BD Dra	54371.451±0.005	0.722	21384.	C
UY Cyg	54329.469±0.002	0.051	56885.	C	BD Dra	54372.633±0.005	0.726	21386.	C
UY Cyg	54342.370±0.005	0.055	56908.	C	BD Dra	54378.529±0.002	0.731	21396.	C
UY Cyg	54352.461±0.002	0.054	56926.	C	BD Dra	54397.372±0.002	0.725	21428.	C
UY Cyg	54365.360±0.003	0.056	56949.	C	BD Dra	54401.493±0.002	0.722	21435.	C
UY Cyg	54366.477±0.002	0.052	56951.	C	BD Dra	54407.386±0.005	0.725	21445.	C
UY Cyg	54370.402±0.002	0.052	56958.	C	BD Dra	54423.307±0.003	0.741	21472.	C
UY Cyg	54374.327±0.003	0.052	56965.	C	BD Dra	54430.369±0.005	0.735	21484.	C
UY Cyg	54375.449±0.002	0.053	56967.	C	BD Dra	54450.401±0.003	0.739	21518.	C
UY Cyg	54383.297±0.003	0.051	56981.	C	BK Dra	54289.431±0.003	-0.154	48585.	C
UY Cyg	54397.322±0.003	0.058	57006.	C	BK Dra	54331.467±0.002	-0.155	48656.	C
UY Cyg	54416.385±0.003	0.057	57040.	C	BT Dra	54290.411±0.003	-0.014	40015.	C
XZ Cyg ²	54285.490±0.005	0.001	12248.	C	RT Equ	54318.653±0.004	0.035	36978.	LS
XZ Cyg ²	54286.420±0.002	-0.002	12250.	C	RT Equ	54322.654±0.003	0.033	36987.	LS
XZ Cyg ²	54292.480±0.005	-0.008	12263.	C	RT Equ	54325.764±0.005	0.030	36994.	LS
XZ Cyg ²	54300.409±0.003	-0.011	12280.	C	RT Equ	54326.658±0.002	0.034	36996.	LS
XZ Cyg ²	54335.417±0.002	0.002	12355.	C	RT Equ	54329.768±0.005	0.031	37003.	LS
XZ Cyg ²	54350.345±0.002	-0.001	12387.	C	RT Equ	54330.659±0.002	0.032	37005.	LS
XZ Cyg ²	54357.341±0.002	-0.004	12402.	C	RX Eri	54409.718±0.003	-0.010	55713.	LS
XZ Cyg ²	54368.541±0.004	-0.002	12426.	C	RX Eri	54416.763±0.003	-0.012	55725.	LS
DM Cyg	54289.422±0.003	0.060	27883.	C	RX Eri	54453.766±0.005	-0.005	55788.	LS
DM Cyg	54294.456±0.002	0.055	27895.	C	RX Eri	54466.686±0.003	-0.005	55810.	LS

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
SV Eri	54415.641±0.007	0.748	26426.	LS	VZ Her	54329.423±0.002	0.064	39835.	C
SV Eri	54430.634±0.010	0.752	26447.	LS	AR Her	54284.428±0.006	-1.213	27299.	C
SV Eri	54445.625±0.007	0.753	26468.	LS	AR Her	54292.416±0.005	-1.216	27316.	C
XY Eri	54432.651±0.005	-0.252	53530.	LS	BD Her	54317.432±0.005	0.143	45767.	C
XY Eri	54437.667±0.010	-0.224	53539.	LS	BD Her	54326.413±0.002	0.120	45786.	C
XY Eri	54443.785±0.004	-0.202	53550.	LS	BD Her	54327.354±0.005	0.113	45788.	C
XY Eri	54453.722±0.003	-0.242	53568.	LS	BD Her	54335.442±0.003	0.144	45805.	C
XY Eri	54463.6717±0.0015	-0.2688	53586.	LS	BD Her	54344.431±0.002	0.129	45824.	C
BB Eri	54408.780±0.003	0.227	26056.	LS	BD Her	54345.376±0.002	0.126	45826.	C
BB Eri	54452.662±0.002	0.227	26133.	LS	UU Hor	54357.799±0.002	0.146	46040.	LS
RX For	54368.804±0.005	-0.011	24338.	LS	UU Hor	54379.686±0.004	0.147	46074.	LS
RX For	54374.753±0.004	-0.035	24348.	LS	UU Hor	54406.722±0.005	0.149	46116.	LS
RX For	54410.5831±0.0016	-0.0440	24408.	LS	SZ Hya	54448.6918±0.0016	-0.1870	25630.	C
RX For	54417.752±0.003	-0.043	24420.	LS	BI Hya	54232.577±0.002	0.220	50015.	LS
RX For	54423.738±0.003	-0.030	24430.	LS	DD Hya	54445.489±0.002	-0.143	25410.	C
RX For	54429.731±0.003	-0.010	24440.	LS	DD Hya	54448.503±0.0016	-0.140	25416.	C
RX For	54432.7095±0.0016	-0.0182	24445.	LS	DD Hya	54450.517±0.003	-0.133	25420.	C
RX For	54447.610±0.005	-0.051	24470.	LS	DD Hya	54451.516±0.003	-0.137	25422.	C
SS For	54340.821±0.005	-0.130	31633.	LS	DG Hya	54466.833±0.003	0.051	40585.	LS
SS For	54401.754±0.005	-0.136	31756.	LS	ET Hya	54120.6834±0.0018	0.1390	26548.	LS
SS For	54407.699±0.003	-0.136	31768.	LS	ET Hya	54142.6166±0.0017	0.1356	26580.	LS
SS For	54413.645±0.003	-0.135	31780.	LS	ET Hya	54155.643±0.002	0.137	26599.	LS
SW For	54362.757±0.005	0.415	24907.	LS	GO Hya	54445.658±0.004	-0.078	45246.	C
SW For	54411.785±0.005	0.415	24968.	LS	V Ind	54348.681±0.005	-0.136	29672.	LS
SW For	54428.658±0.005	0.409	24989.	LS	V Ind	54372.657±0.002	-0.140	29722.	LS
SW For	54440.722±0.008	0.417	25004.	LS	CQ Lac	54328.437±0.002	0.126	31114.	C
SX For	54380.746±0.004	0.038	25147.	LS	CQ Lac	54333.395±0.003	0.124	31122.	C
SX For	54408.599±0.004	0.045	25193.	LS	CQ Lac	54339.595±0.004	0.124	31132.	C
SX For	54423.728±0.003	0.040	25218.	LS	CQ Lac	54377.422±0.006	0.128	31193.	C
SX For	54437.653±0.003	0.043	25241.	LS	CQ Lac	54385.483±0.003	0.129	31206.	C
SX For	54463.686±0.006	0.046	25284.	LS	CQ Lac	54395.402±0.002	0.127	31222.	C
RR Gem	54394.578±0.002	-0.374	32815.	C	CQ Lac	54405.3227±0.0017	0.1272	31238.	C
RR Gem	54396.563±0.002	-0.376	32820.	C	CQ Lac	54416.487±0.004	0.131	31256.	C
RR Gem	54417.621±0.003	-0.375	32873.	C	RX Leo	54453.693±0.005	0.093	27773.	C
RR Gem	54446.6187±0.0010	-0.3813	32946.	C	WW Leo	54446.567±0.003	0.035	32453.	C
RR Gem	54449.4007±0.0015	-0.3805	32953.	C	X LMi	54414.684±0.005	0.206	22233.	C
RR Gem	54454.5655±0.0010	-0.3807	32966.	C	X LMi	54438.628±0.003	0.199	22268.	C
RR Gem	54455.3608±0.0015	-0.3801	32968.	C	U Lep	54411.762±0.002	0.042	22459.	LS
GI Gem	54408.531±0.002	0.071	55536.	C	U Lep	54425.718±0.002	0.043	22483.	LS
GI Gem	54450.559±0.003	0.073	55633.	C	U Lep	54428.617±0.005	0.034	22488.	LS
GI Gem	54454.4561±0.0015	0.0703	55642.	C	U Lep	54436.769±0.002	0.046	22502.	LS
RW Gru	54345.714±0.005	-0.137	36317.	LS	U Lep	54450.722±0.003	0.043	22526.	LS
TW Her	54284.460±0.002	-0.011	81930.	C	U Lep	54453.631±0.003	0.045	22531.	LS
TW Her	54290.451±0.003	-0.014	81945.	C	VY Lib	54284.636±0.003	-0.027	24610.	LS
TW Her	54296.447±0.002	-0.012	81960.	C	TT Lyn	54416.630±0.003	-0.034	29736.	C
TW Her	54308.435±0.003	-0.012	81990.	C	TT Lyn	54440.525±0.005	-0.036	29776.	C
TW Her	54310.433±0.002	-0.012	81995.	C	TT Lyn	54447.696±0.002	-0.035	29788.	C
TW Her	54312.431±0.003	-0.012	82000.	C	TT Lyn	54455.462±0.004	-0.035	29801.	C
TW Her	54316.431±0.002	-0.008	82010.	C	TW Lyn	54395.653±0.003	0.054	19452.	C
TW Her	54324.418±0.002	-0.013	82030.	C	TW Lyn	54408.664±0.002	0.055	19479.	C
TW Her	54340.403±0.003	-0.012	82070.	C	TW Lyn	54451.550±0.002	0.056	19568.	C
TW Her	54342.400±0.003	-0.013	82075.	C	TW Lyn	54452.514±0.004	0.056	19570.	C
VX Her	54286.460±0.002	-0.411	71450.	C	TW Lyn	54453.477±0.002	0.055	19572.	C
VX Her	54291.469±0.003	-0.411	71461.	C	TW Lyn	54455.404±0.002	0.055	19576.	C
VZ Her	54288.473±0.002	0.064	39742.	C	RZ Lyr	54285.550±0.005	0.006	25628.	C
VZ Her	54299.480±0.002	0.063	39767.	C	RZ Lyr	54324.387±0.004	-0.011	25704.	C
VZ Her	54307.406±0.002	0.063	39785.	C	RZ Lyr	54325.408±0.003	-0.013	25706.	C
VZ Her	54318.415±0.005	0.064	39810.	C	RZ Lyr	54330.519±0.003	-0.014	25716.	C

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
RZ Lyr	54345.352±0.003	-0.007	25745.	C	AR Oct	54338.813±0.004	0.016	44455.	LS
RZ Lyr	54366.314±0.002	-0.006	25786.	C	V445 Oph	54286.618±0.002	0.019	67359.	LS
RZ Lyr	54368.361±0.002	-0.004	25790.	C	V455 Oph	54288.451±0.005	-0.245	27440.	C
RZ Lyr	54370.407±0.002	-0.003	25794.	C	V455 Oph	54298.431±0.003	-0.251	27462.	C
RZ Lyr	54371.431±0.005	-0.001	25796.	C	V816 Oph	54299.571±0.002	-0.102	47146.	LS
AW Lyr	53217.573±0.004	0.053	56058.	C	V964 Ori	54415.679±0.002	-0.388	45409.	LS
AW Lyr	53219.568±0.005	0.058	56062.	C	V964 Ori	54416.689±0.002	-0.387	45411.	LS
AW Lyr	53224.538±0.003	0.054	56072.	C	V964 Ori	54423.7549±0.0015	-0.3864	45425.	LS
AW Lyr	53245.435±0.005	0.058	56114.	C	V964 Ori	54465.640±0.002	-0.388	45508.	LS
AW Lyr	54285.556±0.005	0.017	58205.	C	TX Pav	54284.595±0.002	-0.168	58978.	LS
AW Lyr	54299.475±0.005	0.008	58233.	C	TX Pav	54285.515±0.002	-0.168	58980.	LS
AW Lyr	54308.435±0.005	0.014	58251.	C	TX Pav	54330.583±0.002	-0.167	59078.	LS
AW Lyr	54311.415±0.002	0.009	58257.	C	TX Pav	54342.538±0.005	-0.168	59104.	LS
AW Lyr	54325.345±0.005	0.011	58285.	C	TY Pav	54285.718±0.002	0.275	17952.	LS
CN Lyr	54285.483±0.005	0.022	23820.	C	TY Pav	54325.499±0.003	0.274	18008.	LS
CN Lyr	54297.412±0.005	0.021	23849.	C	TY Pav	54347.523±0.005	0.275	18039.	LS
CN Lyr	54311.394±0.002	0.016	23883.	C	WY Pav	54285.625±0.005	0.071	46582.	LS
CN Lyr	54318.394±0.005	0.023	23900.	C	BH Pav	54284.827±0.002	0.202	55014.	LS
CN Lyr	54325.381±0.003	0.016	23917.	C	BH Pav	54319.655±0.002	0.212	55087.	LS
CN Lyr	54327.434±0.005	0.012	23922.	C	BH Pav	54339.674±0.003	0.198	55129.	LS
CN Lyr	54339.372±0.003	0.020	23951.	C	BH Pav	54340.632±0.005	0.203	55131.	LS
CN Lyr	54353.358±0.004	0.019	23985.	C	BN Pav	54289.755±0.002	-0.027	45759.	LS
IO Lyr	54312.449±0.002	-0.028	25460.	C	BN Pav	54319.811±0.002	-0.031	45812.	LS
IO Lyr	54357.461±0.003	-0.032	25538.	C	BN Pav	54348.733±0.004	-0.035	45863.	LS
IO Lyr	54368.422±0.003	-0.036	25557.	C	BN Pav	54381.627±0.005	-0.037	45921.	LS
Z Mic	54299.685±0.006	-0.117	21642.	LS	BP Pav	54285.551±0.002	0.025	48290.	LS
Z Mic	54323.753±0.010	-0.113	21683.	LS	BP Pav	54319.816±0.002	-0.104	48354.	LS
Z Mic	54329.631±0.004	-0.104	21693.	LS	BP Pav	54320.869±0.005	-0.125	48356.	LS
Z Mic	54373.646±0.009	-0.109	21768.	LS	BP Pav	54345.649±0.005	-0.066	48402.	LS
EM Mus	54296.564±0.002	-0.150	33727.	LS	BP Pav	54372.527±0.005	-0.058	48452.	LS
Y Oct	54292.628±0.003	-0.206	40076.	LS	BP Pav	54373.5822±0.0014	-0.0774	48454.	LS
Y Oct	54296.508±0.004	-0.205	40082.	LS	BP Pav	54382.545±0.003	-0.250	48471.	LS
Y Oct	54327.543±0.003	-0.208	40130.	LS	BP Pav	54412.589±0.005	0.237	48526.	LS
RS Oct	54318.847±0.004	0.097	39277.	LS	DN Pav	54285.834±0.002	0.097	27970.	LS
RS Oct	54320.681±0.005	0.099	39281.	LS	DN Pav	54299.888±0.002	0.098	28000.	LS
RS Oct	54329.846±0.003	0.103	39301.	LS	DN Pav	54369.686±0.003	0.098	28149.	LS
RV Oct	54283.688±0.005	0.126	68574.	LS	DN Pav	54370.624±0.003	0.099	28151.	LS
RY Oct	54327.492±0.004	0.117	46746.	LS	VV Peg	54298.442±0.002	-0.025	30527.	C
RY Oct	54328.617±0.003	0.115	46748.	LS	VV Peg	54317.488±0.003	-0.026	30566.	C
RY Oct	54408.625±0.005	0.111	46890.	LS	VV Peg	54338.488±0.003	-0.027	30609.	C
SS Oct	54285.810±0.004	-0.063	42239.	LS	VV Peg	54365.351±0.002	-0.025	30664.	C
SS Oct	54317.532±0.003	-0.054	42290.	LS	VV Peg	54384.395±0.002	-0.028	30703.	C
SS Oct	54325.613±0.002	-0.057	42303.	LS	VV Peg	54387.330±0.004	-0.023	30709.	C
SS Oct	54326.855±0.002	-0.059	42305.	LS	VV Peg	54405.3996±0.0017	-0.0242	30746.	C
SS Oct	54335.559±0.005	-0.060	42319.	LS	VV Peg	54431.285±0.003	-0.023	30799.	C
SS Oct	54341.774±0.005	-0.063	42329.	LS	AV Peg	54291.503±0.003	0.108	26900.	C
SS Oct	54369.760±0.003	-0.060	42374.	LS	AV Peg	54307.509±0.003	0.108	26941.	C
SS Oct	54371.627±0.005	-0.058	42377.	LS	AV Peg	54309.461±0.002	0.108	26946.	C
SS Oct	54409.563±0.005	-0.053	42438.	LS	AV Peg	54327.418±0.003	0.108	26992.	C
UV Oct	54330.521±0.002	-0.118	36862.	LS	AV Peg	54345.377±0.002	0.110	27038.	C
UW Oct	54283.888±0.002	-0.010	44875.	LS	AV Peg	54363.335±0.003	0.111	27084.	C
UW Oct	54357.670±0.003	-0.013	45041.	LS	AV Peg	54400.4199±0.0017	0.1099	27179.	C
UW Oct	54365.675±0.003	-0.009	45059.	LS	AV Peg	54402.373±0.004	0.111	27184.	C
UW Oct	54372.788±0.003	-0.008	45075.	LS	AV Peg	54407.448±0.003	0.111	27197.	C
UW Oct	54418.566±0.002	-0.012	45178.	LS	AV Peg	54429.309±0.003	0.111	27253.	C
AR Oct	54325.808±0.002	0.000	44422.	LS	BH Peg	54337.513±0.005	-0.081	23358.	C
AR Oct	54328.569±0.002	0.006	44429.	LS	BH Peg	54405.416±0.005	-0.124	23464.	C
AR Oct	54334.874±0.005	0.013	44445.	LS	BH Peg	54432.340±0.003	-0.121	23506.	C

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
BH Peg	54441.326±0.007	-0.109	23520.	C	X Ret	54363.660±0.005	0.197	30336.	LS
CG Peg	54296.487±0.002	-0.046	32526.	C	X Ret	54380.856±0.004	0.173	30371.	LS
CG Peg	54297.417±0.004	-0.050	32528.	C	X Ret	54381.849±0.005	0.182	30373.	LS
CG Peg	54310.499±0.002	-0.048	32556.	C	X Ret	54420.733±0.002	0.199	30452.	LS
CG Peg	54326.383±0.002	-0.047	32590.	C	X Ret	54425.656±0.002	0.202	30462.	LS
CG Peg	54330.585±0.002	-0.049	32599.	C	X Ret	54445.825±0.002	0.200	30503.	LS
CG Peg	54354.409±0.002	-0.049	32650.	C	X Ret	54448.777±0.003	0.200	30509.	LS
CG Peg	54376.367±0.002	-0.047	32697.	C	V675 Sgr	54285.698±0.004	0.065	40322.	LS
CG Peg	54389.446±0.002	-0.048	32725.	C	V675 Sgr	54287.625±0.005	0.065	40325.	LS
CG Peg	54411.402±0.005	-0.047	32772.	C	V756 Sgr	54299.582±0.003	0.097	47455.	LS
CG Peg	54412.336±0.002	-0.047	32774.	C	V756 Sgr	54323.684±0.005	0.097	47501.	LS
DZ Peg	54330.419±0.003	0.160	33653.	C	V1130 Sgr	54289.763±0.005	0.041	47406.	LS
DZ Peg	54350.460±0.002	0.159	33686.	C	V1176 Sgr	54322.685±0.005	0.009	92697.	LS
DZ Peg	54384.469±0.002	0.156	33742.	C	V1645 Sgr	54320.585±0.005	-0.043	36333.	LS
DZ Peg	54386.295±0.003	0.160	33745.	C	V1645 Sgr	54326.668±0.004	-0.041	36344.	LS
DZ Peg	54392.369±0.005	0.161	33755.	C	V1645 Sgr	54341.595±0.005	-0.041	36371.	LS
AR Per	54352.525±0.002	0.055	63719.	C	V494 Sco	54287.659±0.002	-0.146	30799.	LS
AR Per	54355.501±0.002	0.053	63726.	C	V690 Sco	54286.581±0.003	-0.015	25371.	LS
AR Per	54358.483±0.003	0.056	63733.	C	RU Scl	54334.832±0.004	0.403	47050.	LS
AR Per	54383.591±0.003	0.056	63792.	C	RU Scl	54336.800±0.005	0.398	47054.	LS
AR Per	54384.440±0.002	0.054	63794.	C	RU Scl	54375.779±0.002	0.403	47133.	LS
AR Per	54386.568±0.003	0.055	63799.	C	RU Scl	54418.701±0.002	0.405	47220.	LS
AR Per	54389.548±0.004	0.056	63806.	C	RU Scl	54419.686±0.004	0.403	47222.	LS
AR Per	54396.357±0.002	0.056	63822.	C	UZ Scl	54299.779±0.002	0.036	33816.	LS
AR Per	54415.504±0.002	0.053	63867.	C	UZ Scl	54352.776±0.003	0.037	33934.	LS
AR Per	54422.3139±0.0015	0.0543	63883.	C	UZ Scl	54375.679±0.002	0.035	33985.	LS
AR Per	54433.379±0.003	0.055	63909.	C	UZ Scl	54411.611±0.005	0.037	34065.	LS
AR Per	54435.5078±0.0017	0.0562	63914.	C	VW Scl	54322.779±0.003	-0.009	51894.	LS
AR Per	54448.2739±0.0016	0.0559	63944.	C	VW Scl	54323.800±0.005	-0.010	51896.	LS
RV Phe	54329.796±0.003	-0.174	20815.	LS	VW Scl	54346.787±0.004	-0.014	51941.	LS
RV Phe	54350.661±0.003	-0.183	20850.	LS	VW Scl	54363.649±0.005	-0.013	51974.	LS
RV Phe	54372.734±0.005	-0.178	20887.	LS	VW Scl	54365.693±0.005	-0.012	51978.	LS
RV Phe	54384.662±0.005	-0.178	20907.	LS	VW Scl	54407.585±0.004	-0.015	52060.	LS
TZ Phe	54320.817±0.004			LS	VX Scl	54338.800±0.003	-0.565	19966.	LS
TZ Phe	54349.746±0.005			LS	VX Scl	54345.806±0.005	-0.569	19977.	LS
TZ Phe	54365.749±0.005			LS	VX Scl	54382.755±0.003	-0.586	20035.	LS
TZ Phe	54373.757±0.006			LS	VX Scl	54419.709±0.003	-0.597	20093.	LS
TZ Phe	54376.831±0.005			LS	VX Scl	54428.626±0.003	-0.603	20107.	LS
TZ Phe	54402.690±0.006			LS	AE Scl	54339.775±0.005	0.198	23854.	LS
TZ Phe	54413.776±0.008			LS	AE Scl	54361.793±0.002	0.213	23894.	LS
U Pic	54377.817±0.002	0.059	28865.	LS	AE Scl	54381.596±0.003	0.212	23930.	LS
U Pic	54407.761±0.003	0.058	28933.	LS	AE Scl	54410.752±0.002	0.214	23983.	LS
U Pic	54444.7522±0.0013	0.0579	29017.	LS	AF Set	54326.602±0.002	0.097	50988.	LS
U Pic	54452.682±0.003	0.061	29035.	LS	AT Ser	54284.601±0.005	0.032	16725.	LS
RY Psc	54331.586±0.005	0.514	21993.	C	RU Sex ³	54453.616±0.007	0.040	33798.	C
RY Psc	54338.472±0.002	0.514	22006.	C	RU Sex ³	54455.721±0.006	0.043	33804.	C
RY Psc	54356.484±0.003	0.515	22040.	C	BI Tel	54319.754±0.005	-0.159	48912.	LS
RY Psc	54366.546±0.005	0.513	22059.	C	HY Tel	54289.816±0.005	0.009	63521.	LS
RY Psc	54378.731±0.002	0.515	22082.	LS	HY Tel	54327.672±0.004	0.030	63615.	LS
RY Psc	54389.328±0.003	0.517	22102.	C	HY Tel	54352.644±0.003	0.046	63677.	LS
RY Psc	54407.351±0.003	0.530	22136.	C	RW TrA	54284.790±0.002	-0.166	34209.	LS
RY Psc	54412.648±0.003	0.530	22146.	LS	RW TrA	54292.646±0.003	-0.165	34230.	LS
RY Psc	54415.293±0.003	0.526	22151.	C	RW TrA	54365.581±0.005	-0.169	34425.	LS
RY Psc	54433.309±0.002	0.532	22185.	C	RW TrA	54368.574±0.005	-0.168	34433.	LS
XX Pup	54446.725±0.002	0.467	24504.	LS	W Tuc	54322.837±0.004	0.158	27162.	LS
HH Pup	54431.765±0.003	0.009	40772.	LS	W Tuc	54355.592±0.005	0.159	27213.	LS
HK Pup	54456.739±0.007	-0.240	24309.	LS	W Tuc	54364.583±0.004	0.159	27227.	LS
X Ret	54351.859±0.003	0.204	30312.	LS	W Tuc	54367.795±0.003	0.160	27232.	LS

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

Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*	Variable	Maximum HJD 24. . .	$O - C$ (days)	E	Obs.*
W Tuc	54371.644±0.005	0.156	27238.	LS	BK Tuc	54318.809±0.002	-0.088	31958.	LS
W Tuc	54376.784±0.003	0.158	27246.	LS	BK Tuc	54335.860±0.003	-0.093	31989.	LS
W Tuc	54423.666±0.002	0.157	27319.	LS	TU UMa	54448.6135±0.0015	-0.0272	20832.	C
W Tuc	54425.596±0.003	0.160	27322.	LS	EX UMa	54412.564±0.006	0.028	9947.	C
YY Tuc	54327.817±0.003	0.244	19579.	LS	EX UMa	54413.658±0.007	0.037	9949.	C
YY Tuc	54334.802±0.003	0.244	19590.	LS	EX UMa	54449.477±0.005	0.029	10015.	C
YY Tuc	54341.784±0.005	0.240	19601.	LS	SV Vol	54439.777±0.003	0.188	33546.	LS
YY Tuc	54355.753±0.002	0.239	19623.	LS	BN Vul	54291.490±0.005	0.061	14746.	C
YY Tuc	54376.704±0.002	0.234	19656.	LS	BN Vul	54294.461±0.003	0.062	14751.	C
YY Tuc	54411.624±0.005	0.228	19711.	LS	BN Vul	54316.444±0.005	0.062	14788.	C
AE Tuc	54336.862±0.003	0.174	48420.	LS	BN Vul	54332.480±0.003	0.056	14815.	C
AE Tuc	54346.811±0.002	0.178	48444.	LS	BN Vul	54335.456±0.003	0.062	14820.	C
AE Tuc	54357.587±0.002	0.180	48470.	LS	BN Vul	54351.500±0.002	0.064	14847.	C
AG Tuc	54329.748±0.003	0.046	24125.	LS	BN Vul	54354.470±0.003	0.064	14852.	C
AG Tuc	54344.817±0.002	0.051	24150.	LS	BN Vul	54385.367±0.005	0.066	14904.	C
BK Tuc	54284.701±0.003	-0.083	31896.	LS					

* C = Calern, LS = La Silla
1 Boninsegna, 1990
2 Baldwin and Samolyk, 2003
3 Williams, 1993

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