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Observations of RR Lyrae star IL Gem

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Abstract: *IL Gem is an RR Lyrae star of type RRab. It was discovered in 1963 by Hoffmeister but has been neglected for about 50 years. New observations were done by members of BAV at private observatories. New elements were calculated: 2458521.3446 + 0.4994505 *E*

Introduction

IL Gem = SON 7947
Right ascension: 06h39m40.93s at epoch and equinox J2000
Declination: +20° 32' 33.2" at epoch and equinox J2000

IL Gem is a long known RR-Lyrae-star of type RRab. It was already discovered in 1963 by Hoffmeister [1]. He gave its position and the remark: short period. The elements of IL Gem were determined by Gessner 1973 [2]. Her maxima are the most recent ones found in the literature. So IL Gem has been neglected for about 50 years.

Observations

We - some members of BAV - started to observe IL Gem in 2018. We obtained seven maxima of the star in 2019 and 2020 (see Table 1).

The observations were carried out with a 250mm/f10.0 Meade Smith Cassegrain telescope and ST7 CCD-Camera (Bonn/Germany) and a V-filter, a 102mm/f5.0 TeleVue-Refractor (Velden/Germany) and a SIGMA 1603 CCD-Camera containing a cooled Kodak KAF1603ME chip. The exposures were 90 s through an IR & UV cut-off filter. The star was also observed with a robotic telescope 400 mm/f/3.7 ASA Astrograph (Nerpio, Spain) equipped with a cooled FLI Proline

16803 CCD-Camera and a V-filter. Here the exposure times were 120 seconds. This telescope was controlled from Lennestadt via internet.

IL Gem was also observed by the ASAS-SN project [6]. From this database five maxima could be determined. In Figure 1 all observations of IL Gem done at the private observatory Maintz (Bonn/Germany) are shown, with the colours indicating different observing nights. It can be clearly seen that the lightcurves of IL Gem are regular and show no Blahzko modulation. The brightness at maximum is 14.37 mag and 15.34 mag at minimum (instrumental, V filter). M-m is 20% of the period. Examining the newly acquired maxima we found that the O-C values of these maxima became more and more negative.

That is why we revised the elements of IL Gem:

Max: HJD 2458521.3446 + 0.4994505 *E
±0.0012 ±0.0000022

Figure 2 shows the O-C values calculated with the elements of GCVS [3] and the period revised by the authors . The maxima from the ASAS-SN database are indicated in this plot. Lightcurves of IL Gem from the ASAS-SN database are shown in Figure 3. Both panels show the phased lightcurve of the star; no secondary modulations are visible. In Table 1 all maxima known to the authors are given. The values of O-C are calculated using the newly determined elements.

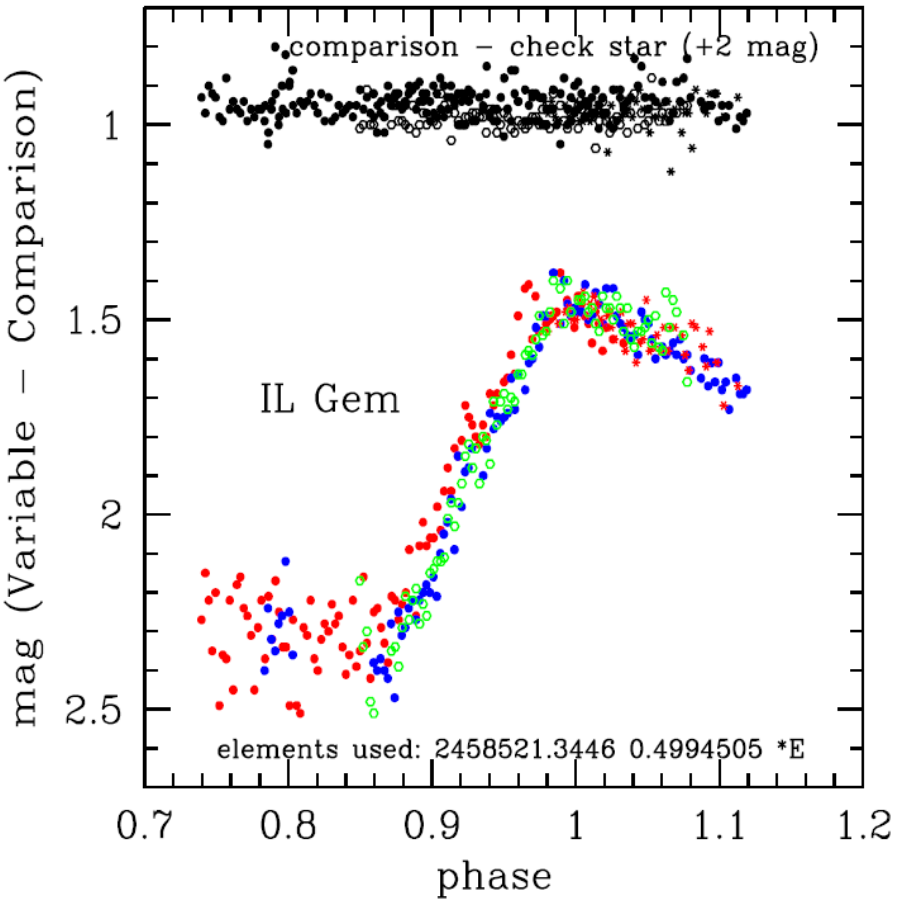

Figure 1: All observations of IL Gem done at the private observatory Maintz in Bonn (Germany). comparison star = GSC 1337-0623, check star = UCAC4 553-030487.

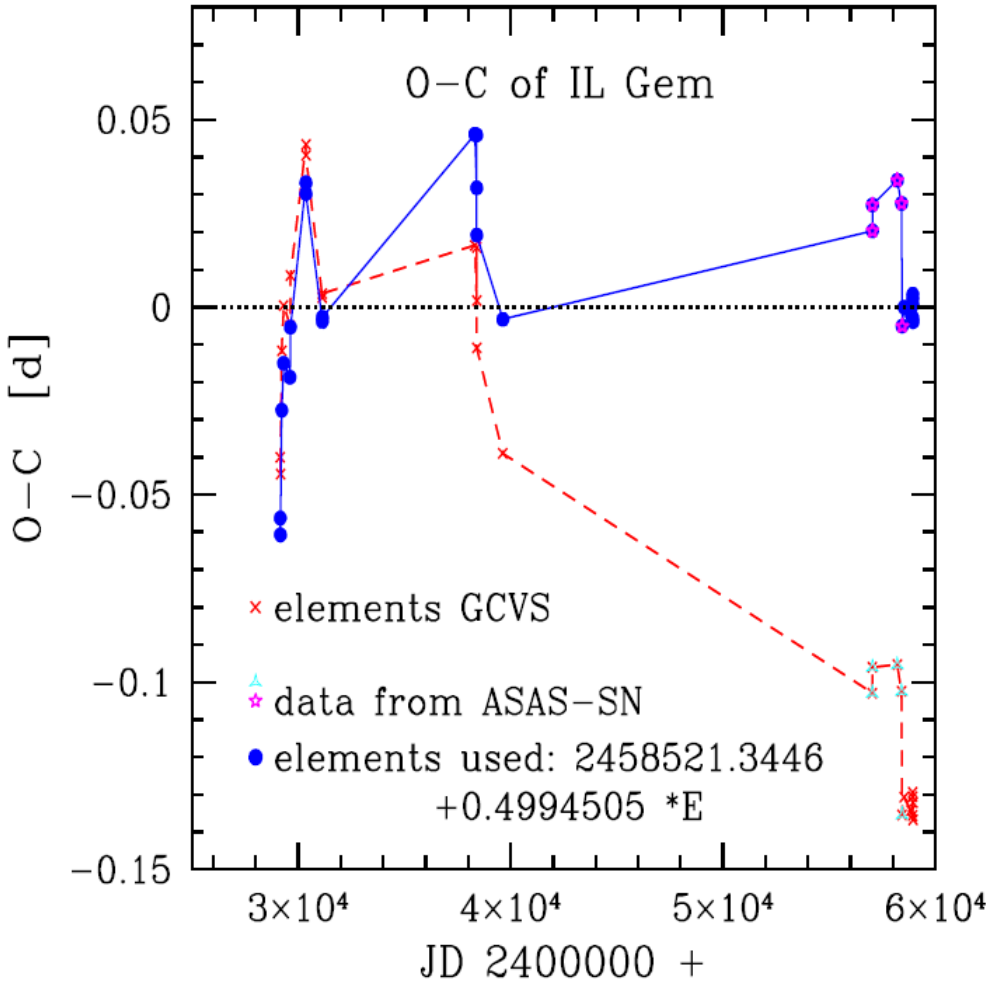

Figure 2: O−C values of IL Gem calculated with the elements of the GCVS and the revised elements of the authors. Data from ASAS-SN have been included into the analysis as well.

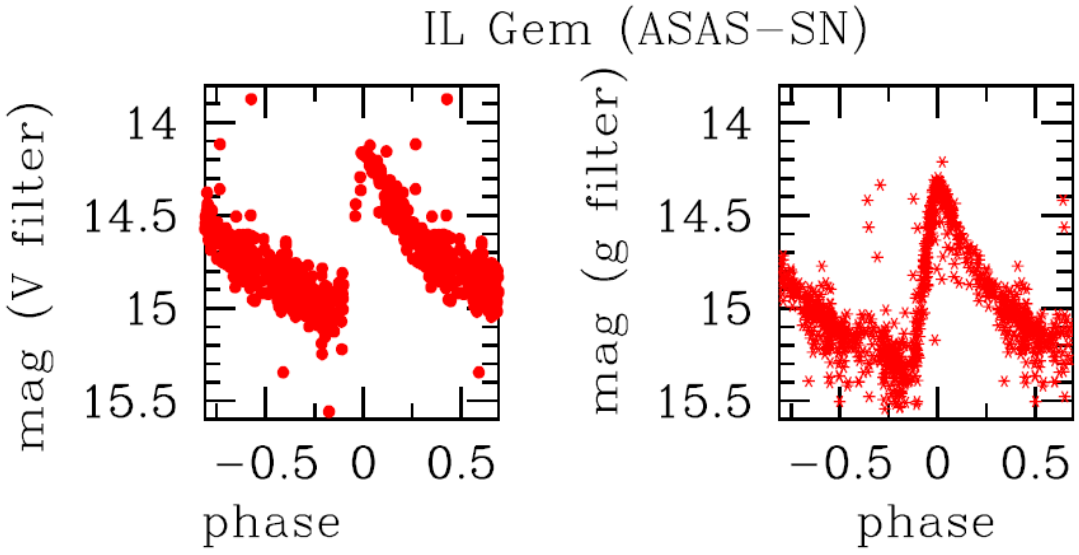

Figure 3: ASAS-SN lightcurves of IL Gem (left panel: V-band light curve; right panel: g-band light curve).

Table 1: All maxima of IL Gem known to the authors

Star	maxima HJD	O-C [d]	epoch [d]	Observer
IL Gem	2429163.5880	-0.0562	-58780	Gessner 1973
IL Gem	2429168.5780	-0.0607	-58770	Gessner 1973
IL Gem	2429231.5420	-0.0275	-58644	Gessner 1973
IL Gem	2429317.4600	-0.0150	-58472	Gessner 1973
IL Gem	2429617.6260	-0.0187	-57871	Gessner 1973
IL Gem	2429641.6130	-0.0053	-57823	Gessner 1973
IL Gem	2430368.3520	0.0332	-56367	Gessner 1973
IL Gem	2430369.3480	0.0303	-56365	Gessner 1973
IL Gem	2431145.4600	-0.0038	-54812	Gessner 1973
IL Gem	2431146.4600	-0.0027	-54810	Gessner 1973
IL Gem	2438318.6180	0.0461	-40450	Gessner 1973
IL Gem	2438406.5070	0.0318	-40274	Gessner 1973
IL Gem	2438407.5200	0.0459	-40272	Gessner 1973
IL Gem	2438410.4900	0.0192	-40266	Gessner 1973
IL Gem	2439641.6130	-0.0032	-37801	Gessner 1973
IL Gem	2457037.9970	0.0204	-2971	ASAS SN
IL Gem	2457039.0028	0.0273	-2967	ASAS SN
IL Gem	2458206.7246	0.0338	-630	ASAS SN
IL Gem	2458406.9981	0.0277	-230	ASAS SN
IL Gem	2458436.9324	-0.0051	-170	ASAS SN
IL Gem	2458521.3446	0.0000	0	Moschner
IL Gem	2458850.4806	-0.0019	658	Maintz
IL Gem	2458926.3961	-0.0029	810	Maintz
IL Gem:	2458934.3936	0.0034	826	Maintz
IL Gem	2458934.3924	0.0022	826	Frank
IL Gem	2458939.3854	0.0007	836	Frank
IL Gem	2458945.3742	-0.0039	848	Maintz

Acknowledgements

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References:

[1] Hoffmeister,C., AN 287, H.4, 169, (1963)

[2] Gessner, H., VSS 7, 5, XIV, 521 (1973)

[3] GCVS; General Catalogue of Variable Stars (Samus et al. 2007-2013)

[4] National Optical Astronomy Observatory
http://ast.noao.edu/data/software

[5] Motl, David: MuniWin, http://c-munipack.sourceforge.net

[6] All-Sky Automated Survey for Supernovae ASAS-SN
http://www.astronomy.ohio-state.edu/asassn/index.shtml
Shappee et al., 2014, ApJ, 788, 48S
https://ui.adsabs.harvard.edu/abs/2014ApJ...788...48S
Jayasinghe et al., 2019, MNRAS, 485, 961J
https://ui.adsabs.harvard.edu/abs/2019MNRAS.485..961J:

[7] GEOS RR Lyr Database
Le Borgne et al., 2007, Astronomy and Astrophysics 476, 307
http://rr-lyr.irap.omp.eu/dbrr/index.php