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THE FIRST PERIOD CHANGE DISCOVERED IN THE BRIGHT ALGOL SYSTEM UV LEONIS

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The UV Leo system consists of two detached main sequence stars of solar type and nearly equal properties (m_1=0.99, m_2=0.92, R_1=1.00, R_2=1.11 solar masses and radii, according to Giuricin et al. [11]). Hoffmeister [14] discovered the variability and the system has soon classified as an eclipsing binary by Jensch [16]. The depth of the primary and the secondary minima is nearly equal, nevertheless some small night-to-night fluctuation in the light curve has been observed [3], probably due to intrinsic variability of one or both of the components. The magnitude outside eclipse is given as V=8.91 by Popper [33], so the system is fairly bright.

The correct period very near to 0.600 days was first derived by Schneller [35]. McCluskey [22] demonstrated that the period of UV Leo had been constant since at least 1933. This finding can also be extended back to 1897 on base of data from sky-patrol plates given by Gaposchkin [10]. The period change claimed by Ahnert [1] around the year 1952 could not be confirmed. Elements published by Rafert [34] – also cited in the 4th edition of the GCVS – describe the light variations well from 1897 up to the early eighties:

$$\text{Hel.Min. I} = \text{J.D. } 2438440.72633 + 0^{\text{d}}.60008478 \times \text{E} \qquad (1)$$

At Nürnberg Observatory UV Leonis has been observed photoelectrically since 1964 ([9, 17, 18, 26-32]). We continued monitoring the system using a 0.34 m Cassegrain telescope, equipped with a 1P21 phototube, and V filter. Five new times of minima, determined from the light curves, are included in Table 1, which lists all available times of minima from the literature and their O−C residuals, computed against elements (1). The data given by Soliman et al. [36] was not included, since it seems to suffer from systematic error.

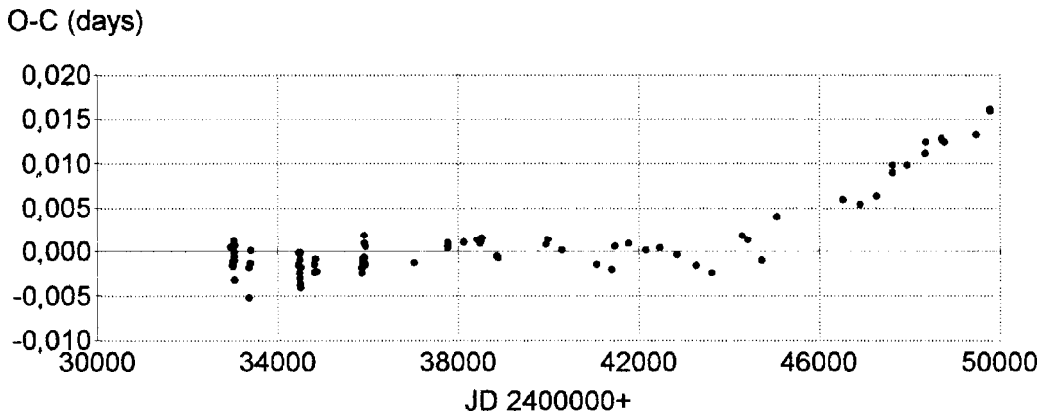

Figure 1.

Table 1

Hel. JD 2400000+	$(O-C)_1$ days	E cycle	Observer and Ref. No.	Hel. JD 24400000+	$(O-C)_1$ days	E cycle	Observer and Ref. No.
32951.4513	0.0005	−9147.5	Perek [24]	35905.370	0.002	−4225	Szczepan. [37]
32981.4535	−0.0015	−9097.5	Perek [24]	35934.4708	−0.0014	−4176.5	Broglia [4]
32995.5559	−0.0011	−9074	Perek [24]	35935.373	0.001	−4175	Szczepan. [37]
32997.3561	−0.0012	−9071	Perek [24]	37017.324	−0.001	−2372	Herczeg [8]
32999.4559	−0.0017	−9067.5	Perek [24]	37758.7310	0.0010	−1136.5	McCluskey [22]
33000.3565	−0.0012	−9066	Perek [24]	37764.7313	0.0005	−1126.5	McCluskey [22]
33006.3571	−0.0014	−9056	Perek [24]	37765.6316	0.0007	−1125	McCluskey [22]
33021.3615	0.0008	−9031	Perek [24]	38111.5809	0.0011	−548.5	McCluskey [22]
33024.3602	−0.0009	−9026	Perek [24]	38416.7243	0.0014	−40	McCluskey [22]
33027.3627	0.0012	−9021	Perek [24]	38440.7275	0.0012	0	McCluskey [22]
33030.361	−0.001	−9016	Piotrowski [25]	38470.7315	0.0010	50	McCluskey [22]
33030.3619	0.0000	−9016	Perek [24]	38474.6325	0.0014	56.5	McCluskey [22]
33033.3618	−0.0005	−9011	Perek [24]	38495.6353	0.0012	91.5	McCluskey [22]
33039.360	−0.003	−9001	Piotrowski [25]	38512.438	0.002	119.5	Müller [28]
33039.3639	0.0007	−9001	Perek [24]	38852.384	0.000	686	Krausser [28]
33349.3052	−0.0018	−8484.5	Wallenquist [24]	38882.388	−0.001	736	Pohl [28]
33354.4025	−0.0052	−8476.5	Wallenquist [24]	39940.339	0.001	2499	Bickel [29]
33386.811	−0.001	−8422	Nason [23]	39978.445	0.001	2562.5	Kurutac [29]
33390.713	0.000	−8415.5	Nason [23]	40291.388	0.000	3084	Ibanoglu [29]
34454.363	0.000	−6643	Szczepan. [37]	41060.395	−0.001	4365.5	Hölzl [17]
34456.462	−0.001	−6639.5	Wellmann [38]	41390.441	−0.002	4915.5	Grampp [18]
34457.362	−0.001	−6638	Wellmann [38]	41466.3544	0.0006	5042	Akinci [18]
34475.366	0.000	−6608	Wellmann [38]	41766.3971	0.0009	5542	Ebersberger [18]
34477.464	−0.002	−6604.5	Wellmann [38]	42147.4502	0.0002	6177	Ebersberger [30]
34479.565	−0.002	−6601	Wellmann [38]	42453.4937	0.0004	6687	Besold [31]
34481.366	−0.001	−6598	Wellmann [38]	42838.4473	−0.0003	7328.5	Ebersberger [32]
34487.364	−0.004	−6588	Wellmann [38]	43266.3065	−0.0016	8041.5	Ertan [9]
34488.565	−0.003	−6586	Wellmann [38]	43608.3540	−0.0024	8611.5	Chwastek [27]
34489.468	0.000	−6584.5	Wellmann [38]	44292.4549	0.0019	9751.5	Bode [26]
34493.365	−0.004	−6578	Wellmann [38]	44404.3702	0.0014	9938	Elias [19]
34496.365	−0.004	−6573	Wellmann [38]	44716.412	−0.001	10458	Diethelm [20]
34501.468	−0.002	−6564.5	Wellmann [38]	45061.4657	0.0040	11033	Fernandes [2]
34803.611	−0.001	−6061	Fracastoro [3]	46521.4739	0.0060	13466	Ells [15]
34808.4108	−0.0023	−6053	Fracastoro [3]	46903.4273	0.0054	14102.5	Diethelm [21]
34827.315	−0.001	−6021.5	Fracastoro [3]	47270.3801	0.0063	14714	Diethelm [5]
34844.416	−0.002	−5993	Fracastoro [3]	47615.4315	0.0090	15289	Wunder [39]
35846.558	−0.002	−4323	Broglia [4]	47616.3325	0.0099	15290.5	Wieck/Wund. [39]
35850.758	−0.002	−4316	Broglia [4]	47945.479	0.001	15839	Hudecek [12]
35867.5619	−0.0008	−4288	Broglia [4]	48332.535	0.011	16484	Paschke [6]
35871.4616	−0.0017	−4281.5	Broglia [4]	48358.3399	0.0124	16527	Blättler [6]
35873.5622	−0.0014	−4278	Broglia [4]	48700.3886	0.0128	17097	Diethelm [29]
35895.4654	−0.0013	−4241.5	Broglia [4]	48757.3963	0.0125	17192	Wunder [39]
35897.5661	−0.0009	−4238	Broglia [4]	49475.3986	0.0133	18388.5	Diethelm [30]
35901.467	−0.001	−4231.5	Broglia [4]	49775.4436	0.0160	18888.5	Wunder [39]
35904.469	0.001	−4226.5	Szczepan. [37]	49776.3439	0.0161	18890	Wund./Traub [39]

From the O−C diagram in Figure 1 it is obvious that the period of UV Leonis increased at around JD 2444000. This is the first reliable period change in the system discovered yet. Calculating new elements for the time since JD 2444000, the least squares method yields:

$$\begin{array}{cccc} \text{Hel.Min. I} = \text{J.D. } 2447615.43178 & + & 0\overset{\text{d}}{.}60086414 & \times \text{ E} \\ & & \pm 31 \qquad\quad & \pm\ 52 \end{array} \tag{2}$$

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