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Improved elements of the eclipsing binary MoV92 = UCAC3 193-019323

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Abstract: *MoV92 Ori = UCAC3 193-019323 Ori was discovered by Wolfgang Moschner in the year 2016 and classified as EW eclipsing binary. The authors present a phased light curve, a list of primary and secondary minima, O-C diagrams and an improved period solution of the star. The variable is known at ASAS-SN and ATLAS.*

Introduction

MoV92 Ori = UCAC3 193-019323 Ori was discovered as a photometric variable by Wolfgang Moschner in the year 2016 and classified as eclipsing binary. The amplitude is given as 0.6 mag, 15.8-16.4 mag (V). The variable is listed in the ATLAS [1] and ASAS-SN-Variable Star Database [2].

During these studies, we furthermore discovered several period solutions for this star in an extensive datasheet prepared by the ATLAS project [1]. One of these periods (ATLAS) is similar to ours. We have at our disposal 13 time series with approx. 1980 images that were taken between 2016 and 2020. The observation time per night was between 4 and 8 hours.

Since the minima derived from our data cannot be represented by the ASAS-SN and ATLAS periods, we have used our data to present an improved period solution.

Periods known so far:

Simbad	no information
ASAS-SN	0.3011746 d
ATLAS	0.3011760 d
VSX [3]	no information
ZTF [4]	no information

Observations

400mm ASA Astrograph f/3.7
f = 1471 mm
FLI Proline 16803 CCD-Camera
V-filter, t = 120 sec.
Wolfgang Moschner, Astrocamp/Nerpio, Spain

Data analysis

Muniwin [5] and self-written programs by Franz Agerer and Lienhard Pagel [6] were used for the analysis of the frames, after bias, dark and flatfield correction of the exposures. The weighted average of five comparison stars was used.

Explanations:

HJD = heliocentric UTC timings (JD) of the observed minima
mag = (raw instrumental) magnitude

G-band mean magnitude = 350-1000 nm
Integrated BP mean magnitude = 330- 680 nm
Integrated RP mean magnitude = 640-1000 nm

Explanations to the light curve:
Different colors denote different observing nights.

All coordinates are taken from the Gaia DR2 catalogue [7].

The coordinates (epoch J2000) are computed by VizieR, and are not part of the original data from Gaia (note that the computed coordinates are computed from the positions and the proper motions).

MoV92 Ori

Cross-ID's
= UCAC3 193-019323
= Gaia DR2 3288271290177614720
= ATOID J074.2793+06.4976
= ASASSN-V J045707.04+062951.7

Right ascension: 04h57m07.0276s at epoch and equinox J2000
Declination: +06° 29' 51.820" at epoch and equinox J2000
Barycentric right ascension (ICRS) at Epoch=2015.5: 074.279319198° +/- 0.04 mas
Barycentric declination (ICRS) at Epoch=2015.5: +06.497689965° +/- 0.02 mas

Gaia DR2 Catalog:
15.7930 mag G-band mean magnitude
16.2267 mag Integrated BP mean magnitude
15.1834 mag Integrated RP mean magnitude
1.0433 mag BP-RP color

Results

With our observations obtained with the 400 mm ASA astrograph in Nerpio we have created a phased light curve. The presented elements were calculated by the method of least squares, taking into account all our minima (see table below) and assuming that the true phase of Min II is exactly 0.5.

Our ephemeris represents a significant improvement over the ASAS-SN period and all ATLAS periods, since our minima are not represented with all periods known so far.

The amplitude for Min I is given as 0.6 mag, 15.8-16.4 mag (V) and for Min II as 0.5 mag, 15.8-16.3 mag (V).

MoV92 Ori = UCAC3 193-019323 Ori (improved elements)

Amplitude: Min I: 0.6 mag (instr.) Min II: 0.5 mag (instr.)
Type: EW type eclipsing binary

Min I = HJD (UTC) 2457752.3624 + 0.3011722*E
+-0.0010 +-0.0000003

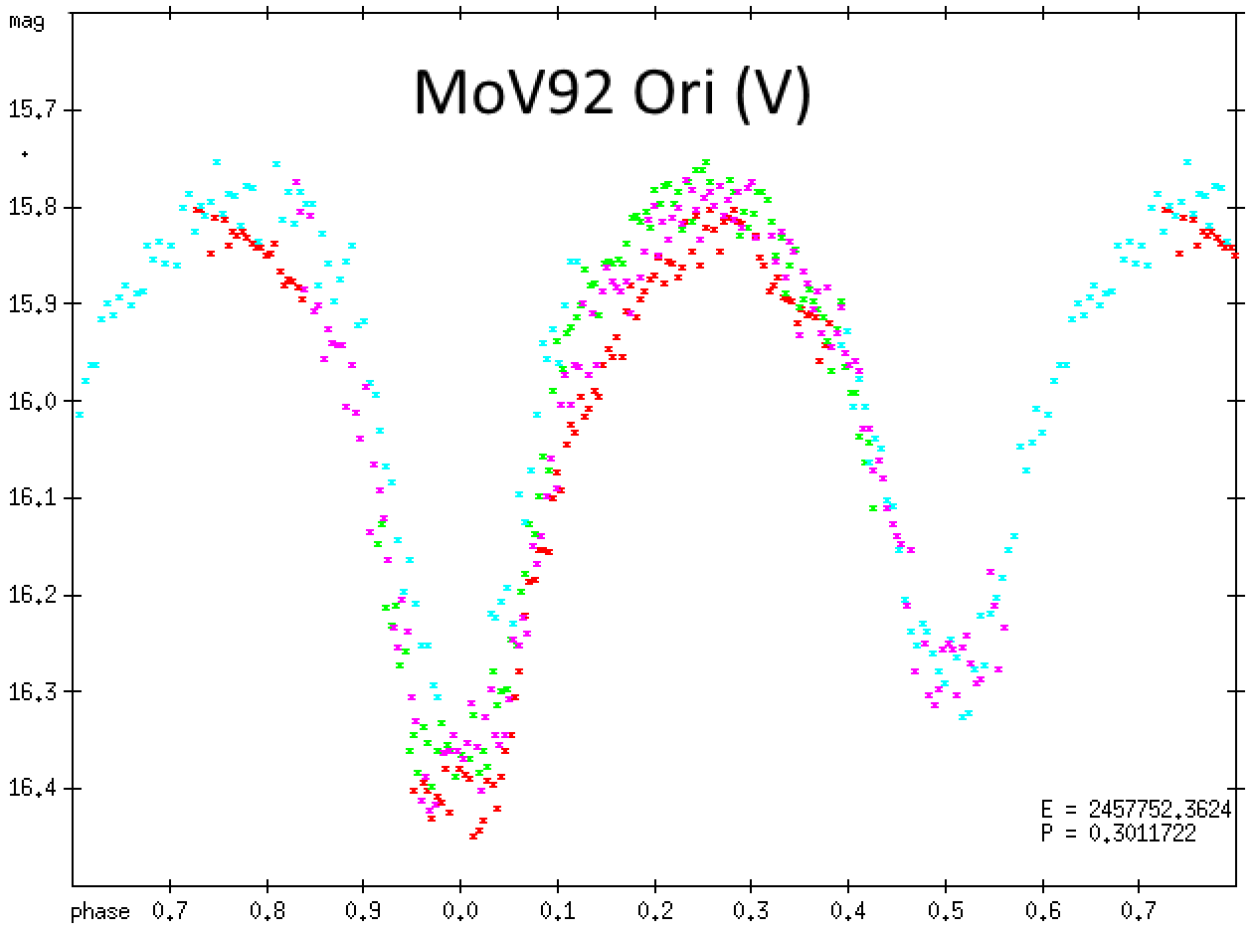

Figure 1: Phased light curve of MoV92 Ori = UCAC3 193-019323 Ori using the ephemeris given by the authors. The vertical axis shows raw instrumental magnitudes. Different colors denote different observing nights. Only the data points from the better nights were used to display the light curve. An FLI Proline 16803 camera + a V-filter (2019-2020) was used.

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)
W. Moschner	2457749,3473	I	-10	-0,0036
W. Moschner	2457749,5005	II	-9,5	-0,0010
W. Moschner	2457752,3624	I	0	-0,0002
W. Moschner	2457752,5133	II	0,5	0,0001
W. Moschner	2457769,3818	II	56,5	0,0030
W. Moschner	2457769,5243	I	57	-0,0051
W. Moschner	2458041,6421	II	960,5	0,0036
W. Moschner	2458138,3169	II	1281,5	0,0021
W. Moschner	2458138,4690	I	1282	0,0036
W. Moschner	2458523,3619	I	2560	-0,0015
W. Moschner	2458764,6007	I	3361	-0,0017
W. Moschner	2458846,3730	II	3632,5	0,0024
W. Moschner	2458846,5190	I	3633	-0,0022
W. Moschner	2458852,3922	II	3652,5	-0,0019
W. Moschner	2459139,5610	I	4606	-0,0008
W. Moschner	2459139,7115	II	4606,5	-0,0008
W. Moschner	2459161,5470	I	4679	-0,0004
W. Moschner	2459161,7017	II	4679,5	0,0038

Table 1: Minima MoV92 Ori = UCAC3 193-019323 Ori, O-C using the ephemeris given by the authors. The O-C of the secondary minima were computed assuming that the true phase is at exactly 0.5.

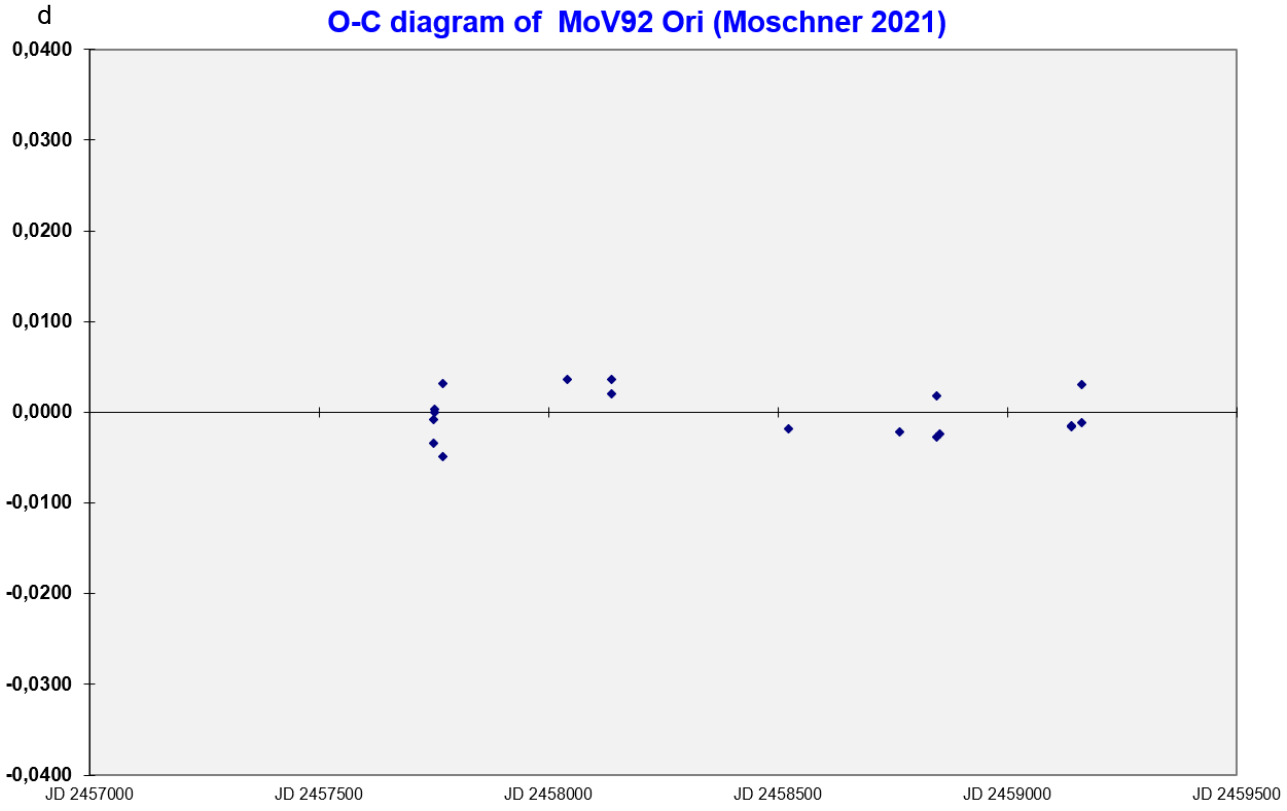

Figure 2: O-C-diagram for MoV92 Ori = UCAC3 193-019323 Ori using the ephemeris given by the authors.

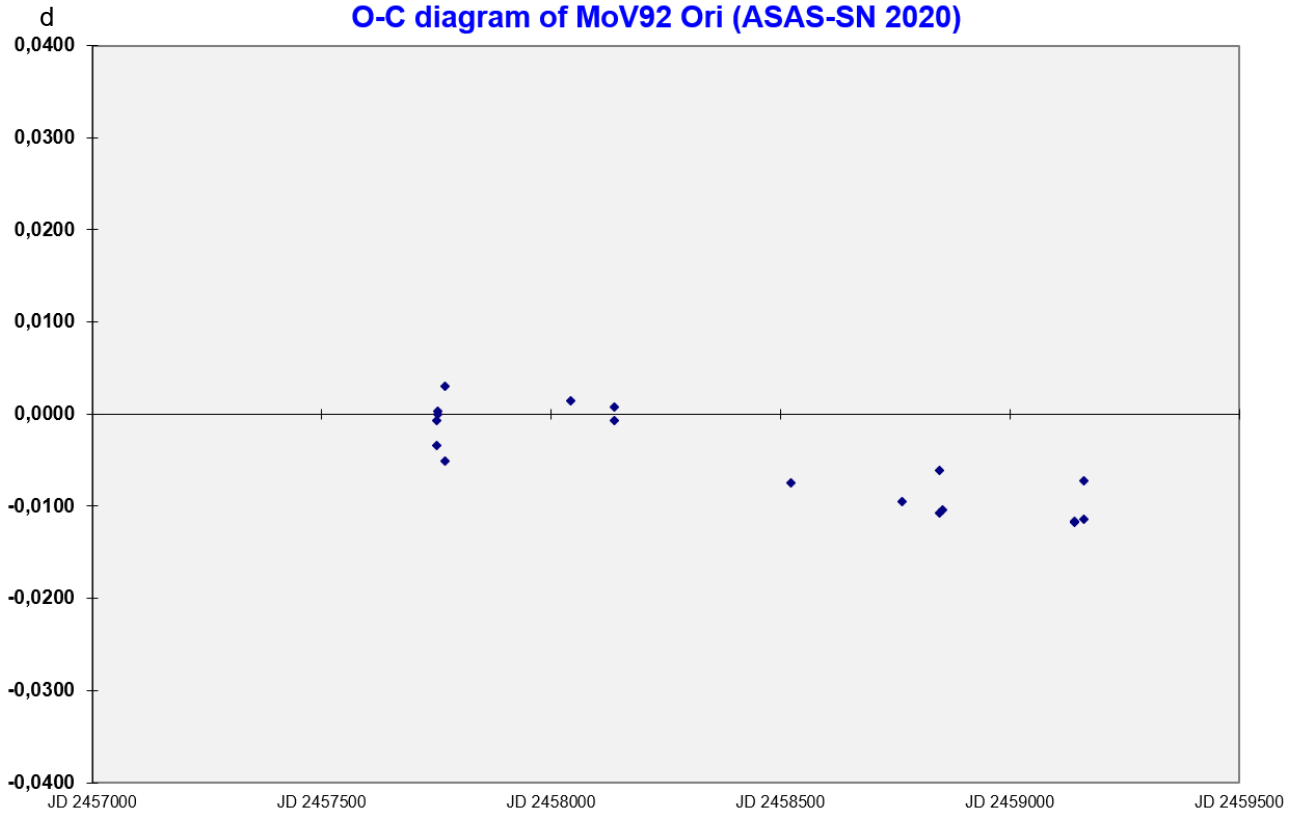

Figure 3: O-C-diagram for MoV92 Ori = UCAC3 193-019323 Ori using the period from ASAS-SN.

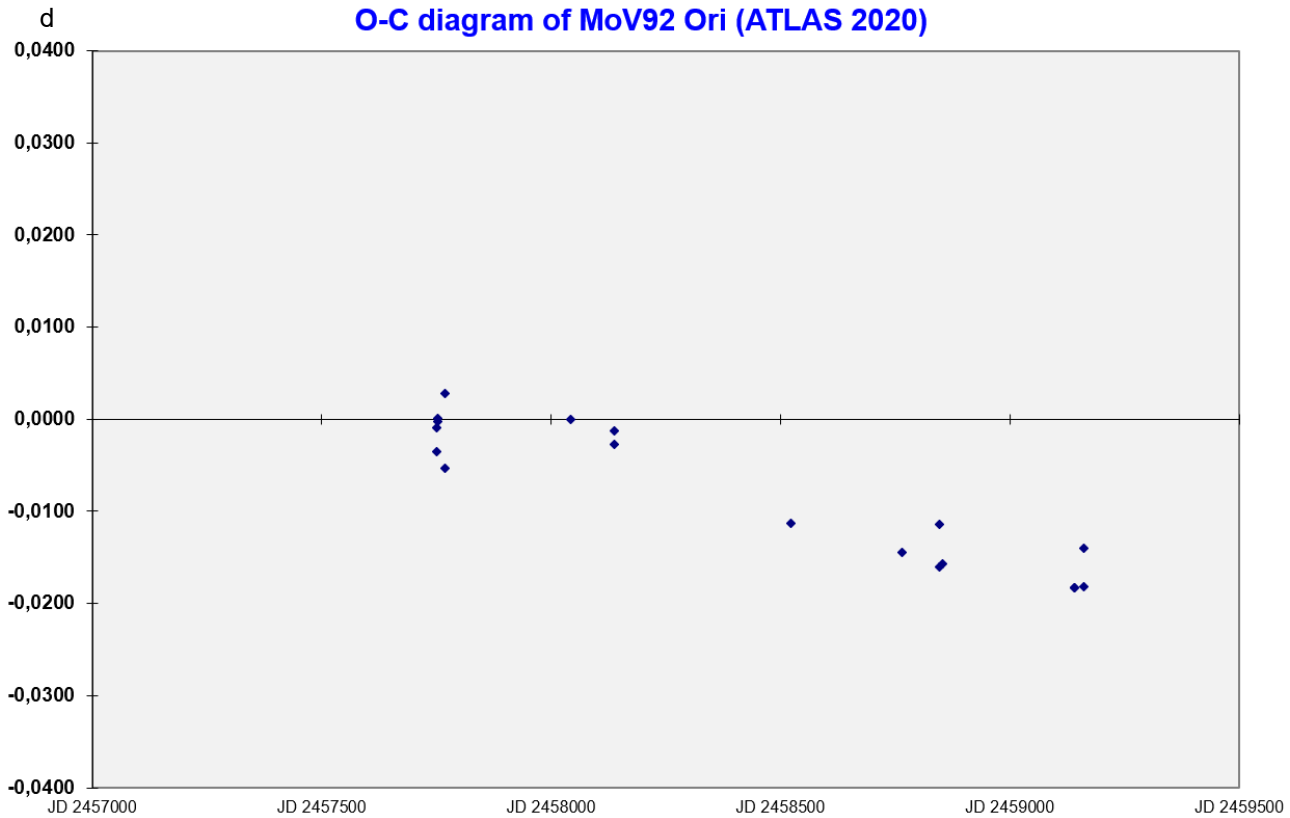

Figure 4: O-C-diagram for MoV92 Ori = UCAC3 193-019323 Ori using the period from ATLAS.

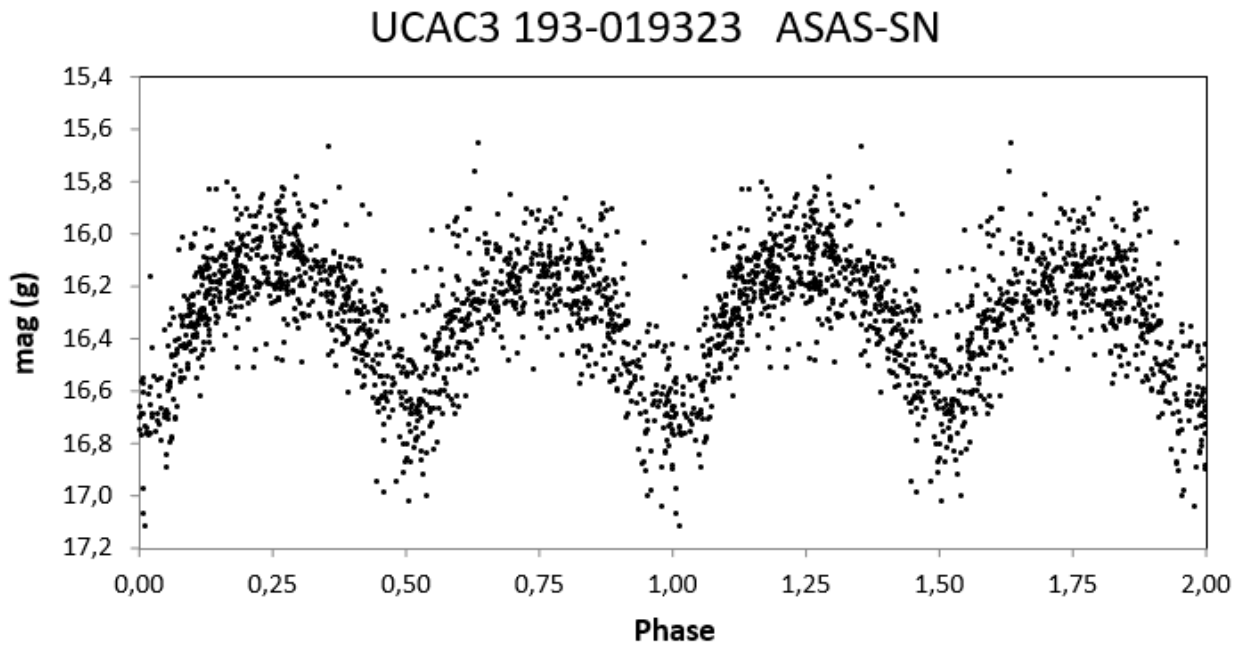

Figure 5: Phased light curve of MoV92 Ori = UCAC3 193-019323 Ori using the new elements and data from ASAS-SN (g-Band).

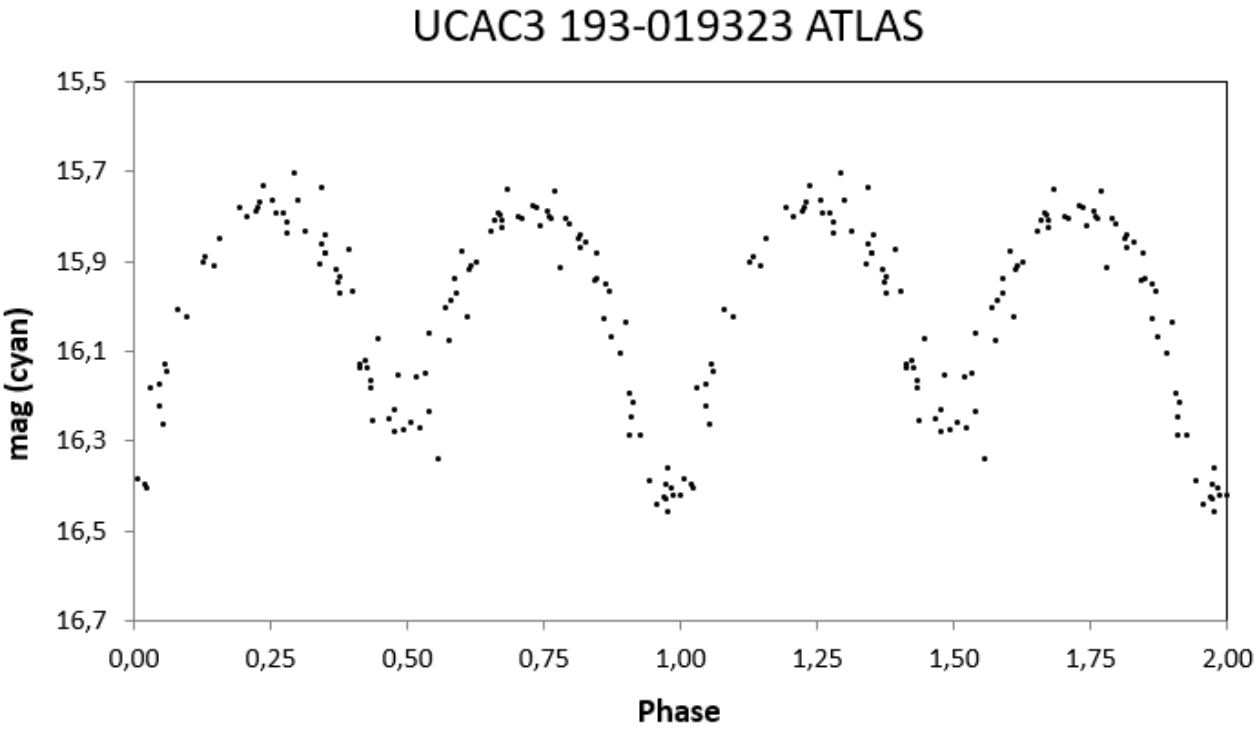

Figure 6: Phased light curve of MoV92 Ori = UCAC3 193-019323 Ori using the new elements and data from ATLAS (Cyan-Filter 420-650 nm).

Acknowledgements

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