The elements of ASASSN-V J021226.31+472342.1 And

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Abstract: *The variable Star ASASSN-V J021226.31+472342.1 And has been listed for some years in several databases with different periods as an eclipsing binary of type EA. The authors present phased light curves from their own data, a list of primary and secondary minima, O-C diagrams and an improved period solution of the star.*

Observations
400 mm ASA Astrograph f/3.7 - f = 1471 mm, FLI Proline 16803 CCD-Camera - V-filter - t = 120 sec.
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Data analysis
Muniwin [1] and self-written programs by Franz Agerer and Lienhard Pagel [2] were used for the analysis of the frames, after bias, dark and flatfield correction. The weighted average of 5 comparison stars was used.

Explanations:
HJD =   heliocentric UTC timings (JD) of the observed minima
All coordinates are taken from the Gaia DR3 catalogue [3]. 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).

ASASSN-V J021226.31+472342.1 And
Cross-IDs
= UCAC4 687-013263   **= Gaia DR3 353439082198178816**
= ATO J033.1096+47.3950   **= 2MASS J02122630+4723420**
= ZTF J021226.33+472341.8

Gaia DR3 catalogue:
Right ascension: 02h12m26.3119   at Epoch J2000
Declination: +47° 23' 42.166"   at Epoch J2000
13.8675 mag G-band mean magnitude (350-1000 nm)
14.2214 mag Integrated BP mean magnitude (330-680 nm)
13.3443 mag Integrated RP mean magnitude (640-1000 nm)
0.8771   mag BP-RP

Periods known so far:

VSX [4]	2.252230 d	ZTF g-band [6]	1.801976 d
Gaia [3]	2.252226 d	ZTF r-band [6]	2.252433 d
ASAS-SN [5]	2.252230 d	ATLAS [7]	2.252087 d

Results

The VSX database, the ZTF database, the Gaia database, the ASAS-SN variable stars database and the ATLAS database also list the star as variable, but with different periods. In SIMBAD [8], the variable can be found under the ID of the ZTF database (ZTF J021226.33+472341.8). It is listed in the VSX database as ASASSN-V J021226.31+472342.1.The variable is located in the same field as MoFr28 And = V803 And and could be measured in approx. 55 time series between 2015 and 2024. The period of ASAS-SN and VSX is similar to that determined by us. The period of Gaia was calculated by us from the value of the column 'Freq d-1' (frequency) of the Gaia database DR3 Part 4. Variability [9].

The presented improved elements were calculated by the method of least squares, taking into account all minima (see table below) and assuming that the true phase of Min. II is exactly at 0.5. Our ephemeris represents an improvement over the VSX, ASAS-SN, ZTF, Gaia and ATLAS periods. Our observations provide no evidence of a period change during the interval from 2016 to 2024. Determining the precise period facilitates long-term planning and enables more accurate predictions of the minima, which are essential for future observations. Continued constancy of the period remains a prerequisite for achieving this goal.

ASASSN-V J021226.31+472342.1 And   improved elements

Type   =   EA
Min. I   =   HJD 2457694.6123 + 2.2522289*E
                     ±0.0008   ±0.0000011

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)
W.Moschner	2457694.6126	I	0	0.0003
W.Moschner	2458042.5817	II	154.5	0.0000
W.Moschner	2458112.4014	II	185.5	0.0007
W.Moschner	2458434.4689	II	328.5	-0.0006
W.Moschner	2458730.6391	I	460	0.0015
W.Moschner	2458766.6731	I	476	-0.0002
W.Moschner	2458818.4740	I	499	-0.0005
W.Moschner	2459150.6759	II	646.5	-0.0024
W.Moschner	2459489.6380	I	797	-0.0008
W.Moschner	2459933.3260	I	994	-0.0018
W.Moschner	2460274.5435	II	1145.5	0.0030
W.Moschner	2460577.4661	I	1280	0.0008

Table 1: Minima of ASASSN-V J021226.31+472342.1 And, O-C using the elements from the authors.
The O-C of the secondary minima were calculated assuming that the true phase is at exactly at 0.5.
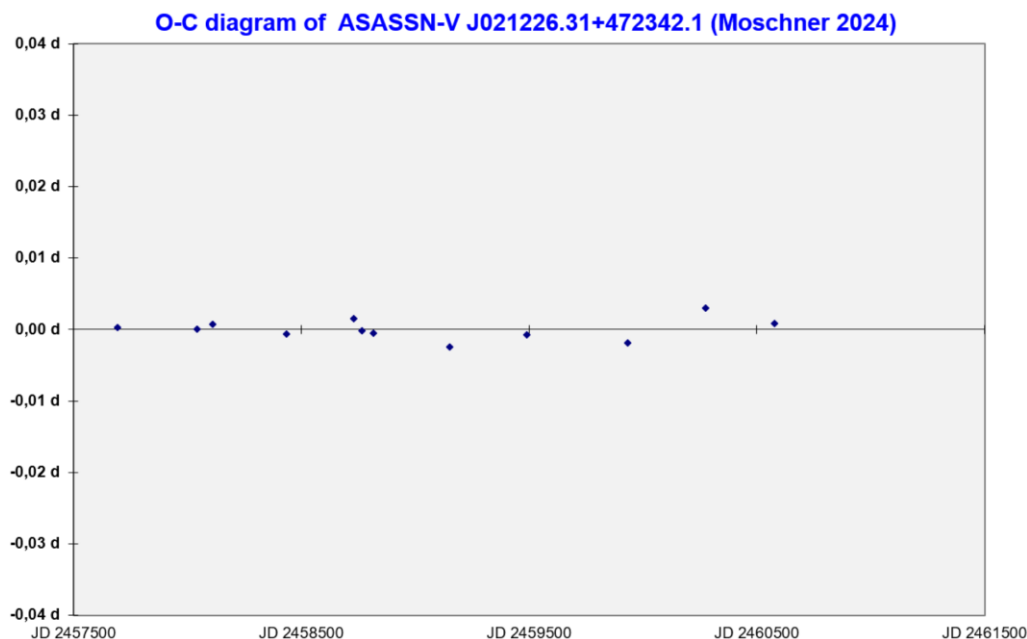

Figure 1: O-C-diagram of ASASSN-V J021226.31+472342.1 And using the improved ephemeris from the authors.
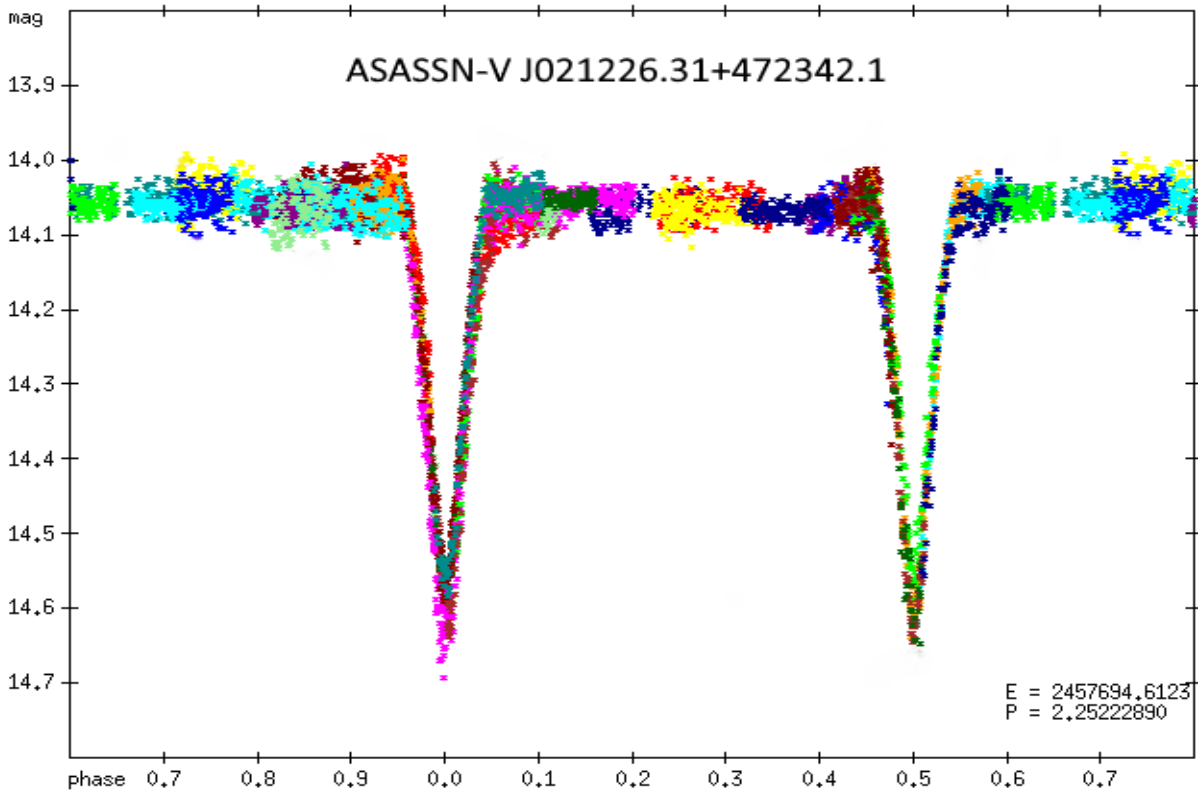
Figure 2: Phased light curve of ASASSN-V J021226.31+472342.1 And using the period and data (V-Band) from the authors.
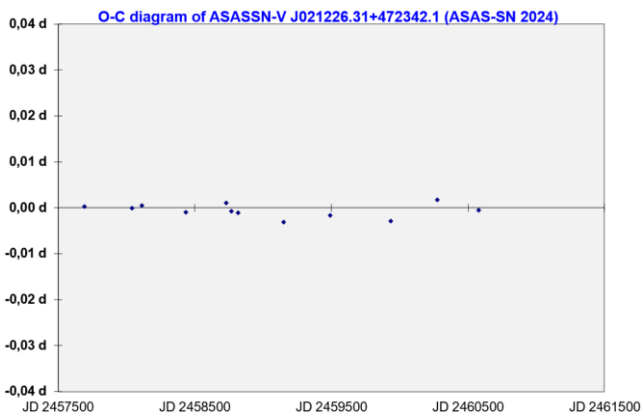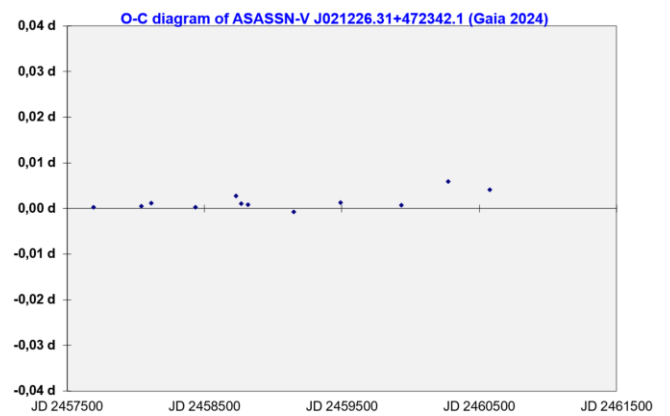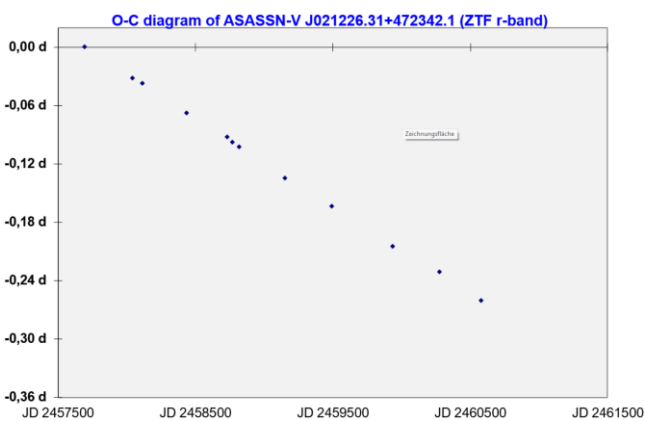

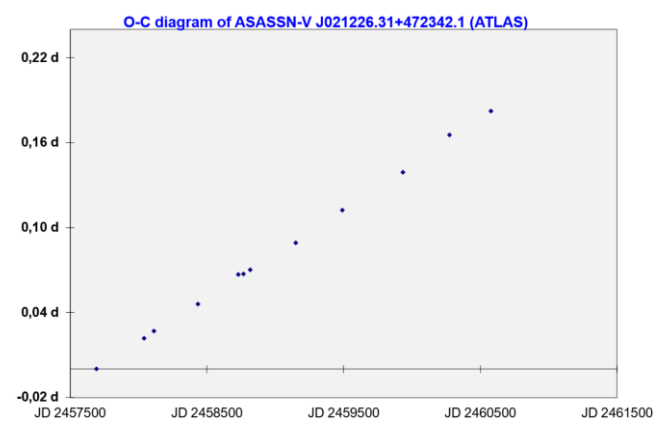Figure 3

Figure 4

Figure 5

Figure 6

Figure 3: O-C-diagram of ASASSN-V J021226.31+472342.1 And using the period from VSX and the ASAS-SN Variable Stars Database (2.252230 d).

Figure 4: O-C-diagram of ASASSN-V J021226.31+472342.1 And using the period from the Gaia database (2,252226 d).

Figure 5: O-C-diagram of ASASSN-V J021226.31+472342.1 And using the period from the ZTF database (2.2524330 d).

Figure 6: O-C-diagram of ASASSN-V J021226.31+472342.1 And using the period from the ATLAS database (2.252087 d).

Acknowledgements

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http://www.astronomy.ohio-state.edu/asassn/index.shtml
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https://www.ztf.caltech.edu/

[7] A first catalog of variable stars measured by ATLAS (Heinze+, 2018)
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[9] Gaia DR3 (Gaia Collaboration. 2020)
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