A New Eclipsing Binary Star in Sagittarius

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Abstract

I present a new variable star in Sagittarius discovered during routine observations of V1223 Sgr for the Centre for Backyard Astrophysics at CBA Pukekohe on 14 June 2014 NZST (JD2456822). The shape of the light curve suggests this star is an eclipsing binary of EW type with a period 0 .25846 days and amplitude of 0.85 mag unfiltered. This star has been submitted to and accepted into the VSX catalog of variable stars.

Introduction

CBA Pukekohe is a node for the Centre for Backyard Astrophysics, and carries out routine observations of cataclysmic variable stars. It is my standard routine to check observed fields for both asteroids and new variables at the end of each observing run using the automatic facility in the MPO Canopus software for this task; the new variable was found in this manner.

Astrometry was completed using Astrometrica (Raab, 2003) and the position was confirmed at RA 18 55 24.45 Dec -31 14 19.2 (figure 1). A search in VSX, Simbad, Aladin and Vizier was carried out which positively identified the star but not its variability. The star position is coincident with star 294-208027 of the UCAC4 catalog, star 301321314827 of the GSC2.2 and NOMAD 0587-0910956. This star has been subsequently been given an AUID of 000-BLQ-565.

Observations

The observatory comprises a 250mm Meade LX200 Schmidt Cassegrain telescope coupled with a Santa Barbra Instrument Group SBIG ST-2000 CCD camera. The camera sensor has an array of 1600 x 1200 square pixels, 7.4 μm sides yielding 1.22 arc seconds per pixel when binned 2x2. Targets of interest are observed unfiltered using 60 second integrations, and are calibrated with dark and flat frames. Photometric measures are made using MPO Canopus (Warner, 2005) software by BDW publishing.

Four nights observing (June 15, 17, 18 and 22) were undertaken on V1223 Sgr which also yielded information on UCAC4 294-208027. The new variable was located on the edge of the field of view so special care was needed in positioning the telescope. Comparison and

check stars were chosen from the AAVSO Variable Star Database and have an AUID of 000-BJM-832 and 000-BJM-034 respectively.

Table 1; Target, Check and Comparison Stars

	AUID	RA	Dec	Mag(V)	B-V
Target	000-BLQ-565	18:55:24.45	-31:14:19.2		
Comparison	000-BJM-831	18:55:01.53	-31:07:53.2	12.90	1.183
Check	000-BLN-292	18:55:29.90	-31:10:36	14.87	0.946

Table 2; Log of Observations

Date	Duration (mins)	Filter	Number
15 Jul 2014	280	Nil	95
17 Jul 2014	266	Nil	225
28 Jul 2014	349	Nil	271
22 Jul 2014	461	Nil	377

Light Curve Analysis

The phased plot (figure 2) was created using the Fourier transform method in MPO Canopus, and gives the Period of 0.25846 days (±0.000569 days) with an epoch of JD 2456853.90107 (±0.002751 days). The magnitude out of eclipse is approx 15.35 with an amplitude of 0.85 mag (unfiltered) for the primary eclipse and 0.65 mag for the secondary eclipse. The magnitude at minimum is approximately 16.20 mag (unfiltered).

The light curve shows no continuous period in eclipse hence we can deduce that the eclipses are only partial for both the primary and secondary eclipse. Inclination will be considerably tilted as EW binaries usually lose totality in eclipse at about 15 degrees. The plot does not indicate any eccentricity in the orbit of the two stars (Warner 2006), but this may be beyond the resolution of the data.   No spectral data could be found for the system.

Conclusion

A new variable star of eclipsing binary type was found in the constellation of Sagittarius near V1223 Sgr. It is almost certainly of EW type however their is some inequality of minima which is on the larger size for this type of eclipsing binary. The period is 0.25846 days and it has an out of eclipse magnitude of 15.35 and shows magnitude drops for the primary and secondary eclipses of 0.85 and 0.65 respectively.

Further filtered observations are planned in standard BVRI to monitor colour variations thought the eclipse cycle and to gain verification of the systems type. Also I will be monitoring for variation in period. If spectral data can be obtained some of the physical

properties may be teased out. Most importantly a reason for the difference in primary and secondary minima will be investigated.

Acknowledgements

References

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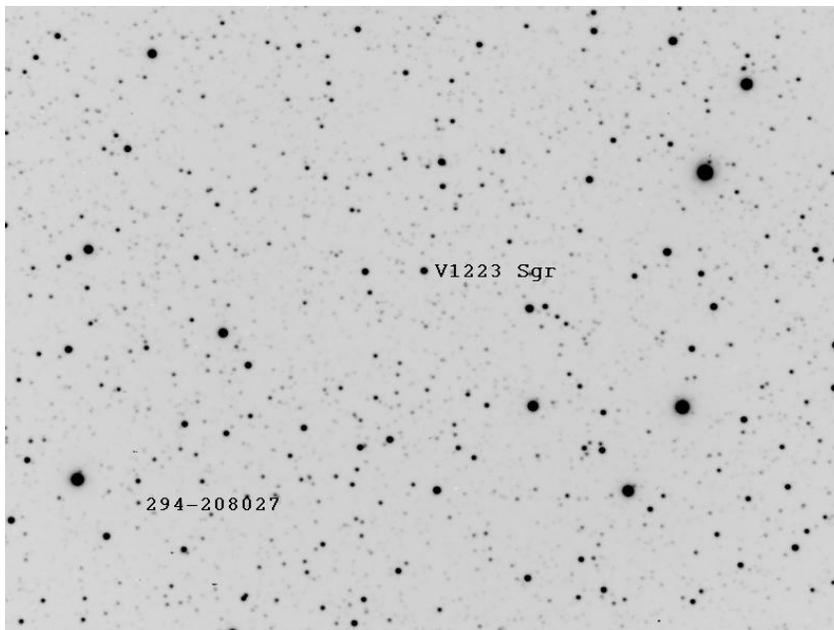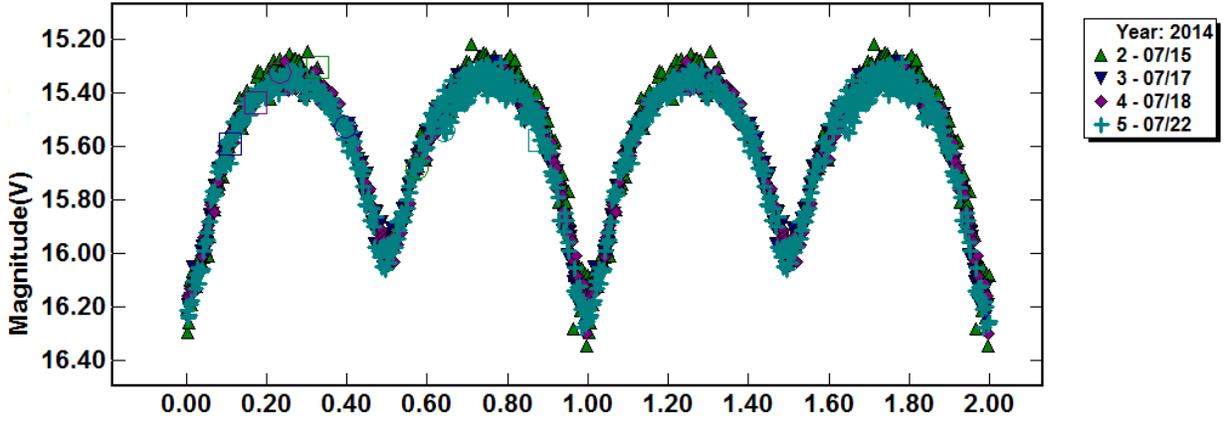
Figure 1. Field containing new Variable and V1223 Sgr

Figure 2. Phase diagram of four nights data over two phases.