

## Five New Variable Stars

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1		GSC 02911-00511	05 48 15.38, +39 02 10.1	EB	12.5	12.9		0.60304	2454346.5408	min		<a href="#">Comm. 1</a>	<a href="#">1.png</a>	<a href="#">1ch.png</a>	<a href="#">1.dat</a>
2		USNO-B1.0 1292-0145813	05 49 00.76, +39 14 34.5	EW	13.7	14.1		0.38781	2454354.4867	min		<a href="#">Comm. 2</a>	<a href="#">2.png</a>	<a href="#">2ch.png</a>	<a href="#">2.dat</a>
3		USNO-B1.0 1515-0260723	19 59 32.13, +61 31 21.4	RRAB	14.6	15.6		0.5862	2454473.541	max		<a href="#">Comm. 3</a>	<a href="#">3.png</a>	<a href="#">3ch5ch.png</a>	<a href="#">3.dat</a>
4		GSC 04232-02322	20 05 23.60, +61 34 45.1	EA	12.9	13.2		2.203	2454476.3320	min		<a href="#">Comm. 4</a>	<a href="#">4.png</a>	<a href="#">4ch.png</a>	<a href="#">4.dat</a>
5		USNO-B1.0 1515-0260840	19 59 54.56, +61 35 58.8	EW	15.2	16.0		0.4102	2454471.5842	min		<a href="#">Comm. 5</a>	<a href="#">5.png</a>	<a href="#">3ch5ch.png</a>	<a href="#">5.dat</a>

### Comments:

1. MinII = 12.7. MaxIM DL photometry with the comparison star GSC 02911-00705 (R1 = 12.42, R2 = 12.33).
2. MinII = 14.05. MaxIM DL photometry with the comparison star GSC 02911-00224 (R1 = 13.00, R2 = 13.12).
3. VaST photometry. The magnitude zero-point was calibrated using V\_T magnitudes of unsaturated Tycho-2 stars in the field.
4. D = 0.117d = 2h48min. MinII = 12.95. VaST photometry with a single comparison star, GSC 4232-02047 (R1 = 11.33, R2 = 12.50).
5. MinII = 15.9. VaST photometry, magnitude zero-point was calibrated using V\_T magnitudes of unsaturated Tycho-2 stars in the field.

### Remarks:

We report the discovery of five new variable stars. Their variability was detected by VaST software (Sokolovsky & Lebedev, 2005; <http://saistud.sai.msu.ru/vast/>) on series of CCD images taken with D=80mm, F=600mm apochromatic refractor equipped with an unfiltered SBIG ST-2000XM camera. For GSC 2911-00511 and USNO-B1.0 1292-0145813, follow-up observations were conducted with the Astrotel Caucasus robotic telescope (D=300mm, F=2310mm) with an unfiltered STL11000M CCD. To

combine these data with the data from ST-2000XM camera, we shifted the zero point of the light curve to match the star's magnitude at maximum light to that for the light curve obtained with ST-2000XM. All observations were conducted at the North Caucasus Astronomical Station of Kazan State University. Magnitudes of comparison stars for GSC 2911-00511, USNO-B1.0 1292-0145813, and GSC 4232-02322 were taken from the USNO-B1.0 catalog (Monet et al., 2003). We have used an average of two red photographic magnitudes (R1, R2) measured at two epochs (typically, POSS I and POSS II plates). Magnitudes of USNO-B1.0 1515-0260723 and USNO-B1.0 1515-0260840 were calibrated using V\_T magnitudes of nearby Tycho-2 stars. Since the spectral response curve of the KAI-2020M CCD chip used in our ST-2000XM camera reaches its maximum in the 410 - 550 nm range, usage of V\_T magnitudes seems justified. For technical reasons, the same could not be done for three variables, for which we used a single comparison star only. Admittedly, all our observations were made without filters, and thus their calibrations remain only the first approximation with respect of the standard photometric systems. Times of primary minima for eclipsing binaries were determined using custom software implementing the Kwee & van Woerden method (Kwee & van Woerden, 1956).

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### **References:**

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