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CLASSIFICATION OF THE VARIABLE STAR CZEV562

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ABSTRACT

CzeV562 is a variable star discovered by František Lomoz and classified in the VSX (Variable Star Index (C. L. Watson et al. (2006))) of the AAVSO (American Association of Variable Star Observers (T. Searle et al. (2006))) as a generic VAR. The SSV-UAI-GRAV has undertaken a multiband photometric campaign in order to correctly catalog the variable star. Based on the data collected in this study, combined with data from existing surveys, it was possible to classify CzeV562 as an EW-type binary variable star with a period of 0.339194 days. The long-term modulation of the average magnitude visible in the surveys revealed the presence of spots on the surface of one of the two components, leading to its classification as an EW/RS-type variable star.

1. BACKGROUND

CzeV562 (A.R.: 14 31 27.09 Dec: -03 39 10.1) is a variable star in the constellation Virgo discovered in 2012 by František Lomoz and classified in the VSX (Variable Star Index) of the AAVSO (American Association of Variable Star Observers) as a generic VAR (variable). The only information available in the american catalog was the maximum V magnitude of 13.75, while the range of variation, the period, a possible epoch, and the spectral class were unknown. In order to understand the nature of the star, the SSV-UAI-GRAV (Variable Stars Section of the Italian Amateur Astronomers Union (I. Peretto (2010))) undertook a multiband observational campaign between April and June 2026.

2. METHODS

Between April and June 2026, the following photometric estimates were obtained by 10 ground-based observatories of the SSV-UAI-GRAV network: 762 estimates in the Johnson V band (error ± 0.015), 261 measurements in the Rc band (± 0.008), and 157 measurements in the B band (± 0.027). In order to standardize the photometric estimates, Nico Montigiani created a reference chart using the following reference stars: USNO B-1.0 0863-0281094 B=14.756 ± 0.121 , V=13.81 ± 0.049 , Rc=13.258 ± 0.077 , USNO B-1.0 0863-0281067 B=14.394 ± 0.111 , V=13.658 ± 0.040 , Rc=13.225 ± 0.058 , USNO B-1.0 0864-0272724 V=17.101 ± 0.131 , V=16.172 ± 0.046 , Rc=15.631 ± 0.059 , USNO B-1.0 0863-0281205 B = 14.439 ± 0.124 , V = 13.475 ± 0.051 , Rc = 12.914 ± 0.082 . To improve the calculation of the variation period, data from the available surveys—ASAS-SN (All-Sky Automated Survey for Supernovae (C. S.

Kochanek et al. (2017))) and ZTF (Zwicky Transient Facility (F. J. Masci et al. (2019)))—were added to the data obtained from the SSV-UAI-GRAV section. All data were processed using the Peranso (Period Analysis Software (E. Paunzen & T. Vanmunster (2016))) software and the PDM method (R. F. Stellingwerf (1978)).

3. RESULTS

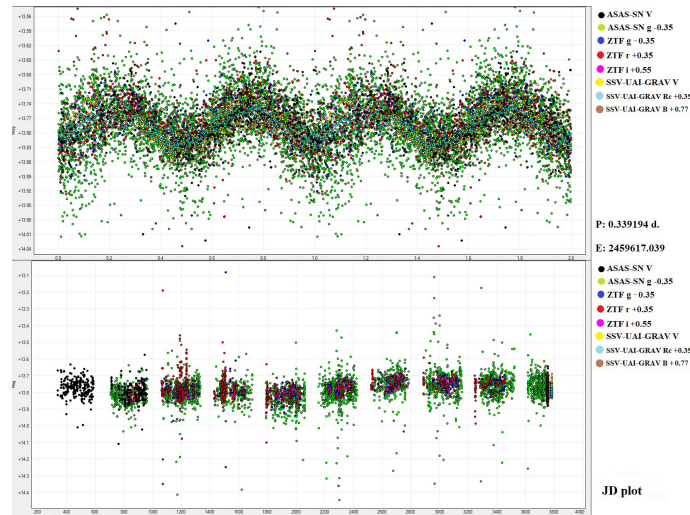


Figure 1. Phase plot (above) and JD plot (below) of CzeV562 with SSV-UAI-GRAV, ZTF and ASAS-SN data.

From the analysis of the data obtained in this way, it was possible to determine the nature of the star, which turned out to be an eclipsing W Ursae Majoris variable (EW), a contact binary system: the two components are so close together that they share a common envelope of matter (the outer atmospheres of the two stars merge into a single convective envelope). The star's period was found to be 0.339194 ± 0.000007 days (8.14 hours), with an epoch identified at Julian date 2459617.039, as shown in Figure 1. The range of variation in the V band was found to be between magnitudes 13.68 and 13.90 V, but there was some dispersion in the survey data, which required further investigation. In fact, upon analyzing the long-term JD curve from the ASAS-SN and ZTF surveys, a modulation of the average magnitude, visible in Figure 1, became apparent. This modulation, combined with the spectral class K derived from the Gaia DR3 Apsis (O. L. Creevey et al. (2023)) satellite data, was interpreted as the presence of spots migrating across the surface of one of the components. This modulation causes the average magnitude to vary by 0.09 mag in V. The star was therefore classified by the AAVSO's VSX as EW/RS, and although the presence of starspots on the surface of contact-type eclipsing binary stars should not be a rarity, this is only the 105th star of this type classified in the AAVSO catalog.

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