Gaia22bou: First recorded outburst of symbiotic star WRAY 15-1167

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WRAY 15-1167 is a symbiotic star discovered by Miszalski & Mikolajewska (2014, MNRAS, 440, 1410) in a sample of emission-line objects selected from the AAO/UKST SuperCOSMOS Halpha Survey. This target was classified as a symbiotic star based on the spectrum obtained on June 18, 2013, with the Southern African Large Telescope (SALT) that showed the continuum of M4 giant together with strong Balmer lines, He I, He II, and possibly also [Fe VII] in emission.

The brightening of WRAY 15-1167 was detected by the Gaia satellite and announced as a Gaia Science Alert (Hodgkin et al., 2021, A&A, 652, A76) on April 16, 2022 (Gaia22bou), when the star had the magnitude G = 12.66. The Gaia G light curve showed that the outburst probably started much earlier (at the turn of years 2021 and 2022). The measurement from the end of February revealed the system to be even brighter (G = 12.58) than at the time of alert publication. The pre-outburst magnitude of WRAY 15-1167 was around G = 14. This suggests the outburst amplitude of around 1.4 mag in the Gaia G filter.

The outburst is also visible in the ASAS-SN light curve (Shappee et al., 2014, ApJ 788, 48; Kochanek et al., 2017, PASP, 129, 104502). Unfortunately, there is a seasonal gap in the observations just at the time when the outburst probably started. Last measurements at the end of September 2021 showed that the system had brightness similar to the level seen since the beginning of ASAS-SN observations. The measurements obtained at the end of December 2021 already revealed the system to be in the outburst. The ASAS-SN observations suggest the amplitude of about 1.5 in the g filter, but the observations might be partially contaminated by the nearby stars.

We obtained two low-resolution optical spectra of the object. The first one was acquired at JD 2 459 687.94 (April 18, 2022) using a remotely-operated Planewave CDK 12.5" telescope located at the iTelescope facility at Siding Springs, Australia equipped with a UVEX spectroscope. A total of five individual spectra were obtained, each with an exposure time of 600 s. The spectrum covers the wavelength range of 4655 - 6832 A and has a resolution of R = 1370. The second spectrum was obtained at JD 2 459 689.72 (April 20, 2022), using the remotely-controlled 30-cm Ritchey-Chretien telescope and Alpy600 spectrograph located in Chile. The spectrum covers the wavelength interval of 3602 - 7808 A with a resolution of R = 560. A total of five individual spectra were obtained, each with an exposure time of 1200 s.

Our spectra (April 18, April 20) revealed the Balmer lines in emission (well visible at least up to Hepsilon), together with several fainter emission lines of neutral helium. Emission lines with higher ionization potential (e.g., He II or [Fe VII]) are not detected in our spectra. TiO

bands are very weak, especially when compared with the spectrum presented by Miszalski & Mikolajewska (2014).

Such behavior and spectral appearance are often observed during the outbursts of classical symbiotic stars (see, e.g., Figure 6.4 in Munari, 2019, arXiv:1909.01389). In response to the expansion of the burning shell of the hot component, its temperature drops, and the emission lines with a high ionization potential disappear from the spectra. At the same time, the rising blue continuum partially obscures the continuum radiation from the giant, causing the diminishing of the TiO bands. Therefore, we classify this ongoing brightening of WRAY 15-1167 as its first recorded Z And-type outburst.

The spectra used in this report are available in the ARAS Database (Teyssier, 2019, CAOSP, 49, 217).