Brightening of SS73 141: Outburst of Z And-type?

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SS73 141 (=WRAY 16-384) is a poorly studied symbiotic star. The optical spectrum of the object, obtained on June 17, 1978, and presented by Allen (1984, PASA, 5, 369) showed prominent TiO bands of late-type giant (later classified as M5 by Murset & Schmid, 1999, A&AS, 137, 473) together with strong emission lines of H I and He II, and relatively faint emission lines of neutral helium.

Recently, Tadashi Kojima (Gunma, Japan) reported a brightening of SS73 141 (see vsnet-alert 26105). In vsnet-alert 26109, Taichi Kato hypothesized, that the ongoing brightening of SS73 141 might be an outburst of a slow symbiotic nova, as opposed to an outburst of classical symbiotic star (Z And-type). For a description of individual types of outbursts observed in symbiotic stars, see, e.g., recent review of symbiotic stars by Munari (2019, arXiv:1909.01389).

According to recent ASAS-SN light curve (Shappee et al., 2014, ApJ 788, 48; Kochanek et al., 2017, PASP, 129, 104502), the outburst started at the beginning of May 2021 and the brightness reached the maximum in the middle of July (around g = 13.4). The median magnitude of the object before the outburst was g ~ 15 resulting in the amplitude of the outburst of 1.6 mag (in g). Since the middle of July, the brightness has remained more or less constant. No previous brightenings are seen in the ASAS-SN light curve nor are reported in the literature (up to our knowledge), making the ongoing brightening the first recorded outburst of SS73 141.

We obtained two low-resolution optical spectra of the object at JD 2 459 451.47 (August 25, 2021) and JD 2 459 452.24 (August 26, 2021). They cover the wavelength range of 4000-5639 A and 3900-7802 A, respectively. The spectra revealed the Balmer lines in emission, together with several faint emission lines of neutral helium. Emission lines with higher ionization potential (e.g., He II) are not detected in our spectra. TiO bands are rather weak, especially when compared with the spectrum presented by Allen (1984).

Such behavior and spectral appearance are often observed during Z And-type outbursts (see, e.g., Figure 6.4 in Munari, 2019). In response to the expansion of the burning shell of the hot component, its temperature drops and 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. The photometric behavior of SS73 141 also seems to point to the outburst of Z And-type. The amplitude of the outburst (1.6 mag) and its timescale (rise to the maximum took around 80 days) are more typical for Z And-type outbursts. Their typical amplitudes are about 1-3 mag in B, with amplitude decreasing towards red. Slow symbiotic novae have typically much larger amplitudes and the rise to the maximum is taking ~1 year or more.

It is definitely worth monitoring this target in the following months to confirm or reject the Z And-type classification. The spectra used in this report are available in the ARAS Database (Teyssier, 2019, CAOSP, 49, 217).