N13c Multiple giant eruptions and X-ray emission in the pre-SN LBV candidate SDSS1133

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We present a comprehensive analysis of 20 years worth of multi-color photometric light curves, multi-epoch optical spectra, and X-ray data of an off-nuclear variable object SDSS1133 in Mrk 177 at $z = 0.0079$. The UV-optical light curves reveal that SDSS1133 experienced three outbursts in 2001, 2014, and 2019. The persistent UV-optical luminosity in the non-outbursting state is $\sim 10^{41}$ erg/s with small-scale flux variations, and peak luminosities during the outbursts reach $\sim 10^{42}$ erg/s. The optical spectra exhibit enduring broad hydrogen Balmer P-Cygni profiles with the absorption minimum at $\sim -2,000$ km/s, indicating the presence of fast moving ejecta. *Chandra* detected weak X-ray emission at a $0.3-10$ keV luminosity of $L_X = 4 \times 10^{38}$ erg/s after the 2019 outburst. These lines of evidence strongly suggests that SDSS1133 is an extremely luminous blue variable (LBV) star experiencing multiple giant eruptions with interactions of the ejected shell with different shells and/or circumstellar medium (CSM), and strongly disfavors the recoiling Active Galactic Nuclei (AGN) scenario suggested in the literature (e.g., Koss et al. 2014, MNRAS, 445, 515). We suggest that pulsational pair-instability may provide a viable explanation for the multiple energetic eruptions in SDSS1133. If the current activity of SDSS1133 is a precursor of a supernova explosion, we may be able to observe a few additional giant eruptions and then the terminal supernova explosion or collapse to a massive black hole in future observations.