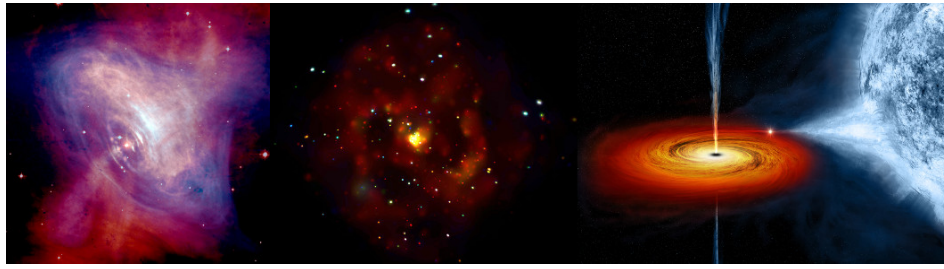


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Decoding the X-Ray Flare from MAXI J0709–159 using multi-epoch optical spectroscopic observations.

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Be/X-ray binaries (BeXBs) form a major subclass of high-mass X-ray binaries that consist of a Be star and a compact object. The possible compact objects can be neutron stars, white dwarfs or black holes. However, neutron stars are the most frequently observed companion than other types. We performed a follow-up study (Bhattacharyya et al. 2022) on the recent detection of two X-ray flaring events by MAXI/Gas Slit Camera observations in soft and hard X-rays from MAXI J0709–159 in the direction of the Be star HD 54786, on 2022 January 25. The X-ray luminosity during the flare was around 10^{37} erg s⁻¹ (MAXI), which got reduced to 10^{32} erg s⁻¹ (NuSTAR) after the flare. We obtained low-resolution spectra of HD 54786 from the 2.01-m HCT and the 2.34-m VBT facilities of India, on 2022 February 1 and 2. By comparing the spectrum of this star with those from the literature, we found variability of He I emission lines. Using photometric techniques we estimated that HD 54786 has an effective temperature of 20,000 K. Though it is reported as a supergiant in previous studies, our analysis favors it to be evolving off the main sequence in the color-magnitude diagram. Interestingly, we could not detect any infrared excess for the star, ruling out the possibility of IR emission from a dusty circumstellar disc. Moreover, our study suggests that HD 54786 is a Be/X-ray binary system with a compact object companion, possibly a neutron star. We are presently monitoring this star through spectral and photometric observations to study its variability in more detail. Our follow-up study of line profile variability and spectral analysis will provide a better understanding of Be stars in such binary systems.

Presentation Type

Oral

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