Title:	An Enigmatic X-Ray Binary :
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Authors:	Varma P K, Bharadwaj.
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Abstract:	With this thesis, I aimed at learning tools and techniques used in X-ray astronomy. X- ray Astronomy is a branch of astronomy where observations are performed using space missions as X-rays cannot penetrate the Earth's atmosphere. Over this period, I have learnt about different physical/emission processes that are responsible for the generation of X-rays in the sky. I have learnt detection tools and techniques that are used. In particular, I have been involved in studying a particular X-ray source, Cyg X-3 which belongs to the class of X-ray sources named as X-ray Binaries. Cyg X-3 is an interesting source located in the Cygnus constellation. One of the key characteristics of this source is that it not only X-ray bright but very luminous in other electromagnetic bands (radio, optical, gamma-rays) as well. Hence, it is a target of interest to perform a multi-wavelength study. In our work, we have used optical (from All Sky Automated Survey for Supernovae) and X-ray data (Neil Gehrels Swift Observatory and Monitor of All-Sky X-Ray Image) to perform our studies. In particular, I have used 3 years of X-ray and optical data to understand the long term spectral evolution of this source. A model-independent way (hardness ratio) was used for the purpose. We found that there exist an anti- correlation between hard and soft X-rays but optical emission is independent of any such correlation. The source was found to be optically bright throughout during the period of three years, starting from 2015. In addition, we have also used pointed observations of this source made with NASA's observatory, NuSTAR. Using the long-term light curves with Swift and MAXI, we no- ticed that the pointed observation of Cyg X-3 used in this work was performed during its hypersoft spectral state. The X-ray light curves obtained with NuSTAR showed a large variability. Therefore, in order to investigate the evolution of spectral parameters with time, we have performed a time-resolved spectroscopy. Our preliminary results revealed large variability in the X-ray flux. However, no significant variation was found in neutral hydrogen column density, optical depths of absorption edges found in the X-ray spectra. In future, we aim at performing a more detailed and careful spectral study of this source to obtain physical insights of the geometry of this system.
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