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Correlation study of spectral parameters of NS-HMXBs with Suzaku

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We present a broadband spectral analysis of classical HMXBs (supergiant and Be/X-ray binaries) and Supergiant Fast X-ray Transients (SFXTs) using data from XIS and PIN instruments onboard Suzaku. After fitting the X-ray spectra of 36 sources with a single model: a powerlaw and a high energy cutoff (where required), we studied the correlation between various spectral parameters. We present the following results: (i) We find a linear correlation between the cyclotron line energy and the cutoff energy as is previously reported in literature using RXTE and Ginga data (for cyclotron line energy less than 35 keV). Using Suzaku observations, though, we find that there is more than one slope of variation between the two quantities. (ii) The variation of cutoff energy with luminosity indicate that NS-HMXBs seem to be divided into two classes following two different trends. This division is not on the basis of different beaming mechanism, as can be studied from the pattern of their pulse profiles. These two groups, notably, show two different patterns when the variation of their photonindex is studied against their cutoff energies. (iii) As seen for LMXBs, we note an anticorrelation between the spectral index and luminosity. (iv) Unlike previous works, we do not see anticorrelation between the X-ray luminosity and the equivalent width of $K\alpha$ lines (Baldwin effect). (v) The equivalent width and the iron $K\alpha$ line flux is smaller in SFXTs than in classical NS-HMXBs.

Collaboration

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