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Spectral and timings analysis of ulxps

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Abstract

Ultraluminous X-ray sources (ULXs) are also known as super-Eddington sources, super-luminous sources, and intermediate luminosity X-ray objects (IXOs). These names highlight their nature as extraordinarily bright X-ray emitters, shining far beyond the Eddington luminosity of a spherically accreting and radiating neutron star (approximately $2 \times 10^{38} \text{ erg s}^{-1}$). In this work I present general spectral and timing analysis of two ULXPs NGC 5907 ULX and M82 X-2 using the data from NuSTAR, NICER, XMM-NEWTON and chandra. A periodicity search was performed using Esearch, yielding spin periods of 1.142 s for NGC 5907 ULX and 1.23 s for M82 X-2, confirming their pulsar nature. The timing analysis also revealed a high pulsed fraction for NGC 5907 ULX, suggesting emission beaming due to a strong magnetic field. Spectral analysis was conducted using quasi-simultaneous observations, modeling the X-ray spectra with multi-component models incorporating thermal and non-thermal emission. The results suggest the presence of super-Eddington accretion in both sources, with evidence of strong magnetic fields. These results provide strong evidence for the neutron star nature of these ULXPs and offer valuable insights into the physical mechanisms enabling super-Eddington accretion in the presence of strong magnetic fields.