



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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A new detection of pulsations from an old ULX

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We report the detection of pulsations from the archetypal ultraluminous X-ray source (ULX) NGC 1313 X-2. Acceleration searches reveal sinusoidal pulsations in segments of two out of six new observations of this object, with a period of ~ 1.5 s and a pulsed fraction of $\sim 5\%$. We demonstrate that the moderate significances of the individual detections are unlikely to originate in false Poisson noise detections given their very close frequencies, with their similarity in properties to other pulsations from ULXs also arguing they are real. The presence of a large bubble nebula surrounding NGC 1313 X-2 implies an age of order 1 Myr for the accreting phase of the ULX, which implies that the neutron star's magnetic field has not been suppressed over time by accreted material, nor has it collapsed into a black hole, despite an average energy output into the nebula two orders of magnitude above Eddington. This argues that most accreted material has been expelled over the active lifetime of the ULX, favouring physical models including strong winds and/or jets for neutron star ULXs. We also present separate evidence from simultaneous X-ray/optical observations of NGC 1313 X-2 that can be interpreted as precession of its central regions, consistent with super-critical accretion disc models including massive radiatively-driven winds.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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