



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: 82

Type: **Poster**

Discovery of one super-Eddington neutron star in an eclipsing X-ray binary

Friday, 13 September 2019 16:14 (2 minutes)

We discovered eclipses and dips in one luminous (and highly variable) X-ray source (CXOM51 J132946.1+471042) in M51. It has a two-component spectrum with additional thermal-plasma emission; it approached an X-ray luminosity of 10^{39} erg s⁻¹ during outbursts in 2005 and 2012. From the timing of three eclipses in a series of Chandra observations, we determine the binary period (52.75 ± 0.63 h) and eclipse fraction (22 ± 0.1 per cent). We also identify a blue optical counterpart in archival Hubble Space Telescope images, consistent with a massive donor star (mass of ~ 20 - $35 M_{\odot}$). By combining the X-ray light-curve parameters with the optical constraints on the donor star, we show that the mass ratio in the system must be $M_2/M_1 \gtrsim 18$ and therefore the compact object is most likely a neutron star (exceeding its Eddington limit in outburst). The general significance of our result is that we illustrate one method (applicable to high-inclination sources) of identifying luminous neutron star X-ray binaries, in the absence of X-ray pulsations or phase-resolved optical spectroscopy. Finally, I will discuss the different X-ray spectral appearance expected from super-Eddington neutron stars and black holes at high viewing angles.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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Session Classification: POSTER SESSION