



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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Universal detection of high-temperature emission in X-ray isolated neutron stars

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X-ray Isolated Neutron Stars (XINSs) are nearby, strongly magnetized, thermally emitting neutron stars without non-thermal emission in any energy band, from radio to Gamma-ray. So far, only seven XINSs discovered by ROSAT are known. Since the discovery in 1990s, their X-ray spectra have been interpreted simply with a single-temperature blackbody (1BB) model.

Stacking all the data observed with XMM-Newton, we find that the brightest XINS, RX J1856.5-3754, shows high-temperature emission, “keV-excess”, over the 1BB model (Yoneyama et al. 2017, PASJ 69, 51). We then search for the similar excess emission in the other six XINSs and find that all the six show the keV-excess (Yoneyama et al. 2019, PASJ 71 17). Their X-ray spectra including the keV-excess are universally reproduced with a two-temperature blackbody model. Five out of seven sources show similar spectral parameters with those of magnetars. For the other two sources, the emission mechanism of the keV-excess can be understood as emission from rotating polar caps. We discuss the similarity between the XINSs and magnetars and the possibility to determine the mass and radius of neutron stars using the keV-excess.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

Affiliation

Osaka University

Primary author: YONEYAMA, Tomokage (Osaka University)

Co-authors: Mr HAYASHIDA, Kiyoshi (Osaka University); Dr NAKAJIMA, Hiroshi (Kanto Gakuin University); Prof. MATSUMOTO, Hironori (Osaka University)

Presenter: YONEYAMA, Tomokage (Osaka University)

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