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The unusual broadband X-ray continuum variability seen from Ultraluminous X-ray Sources

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Observational studies of Ultraluminous X-ray Sources (ULXs, L > 1e39 erg/s) have taken on greater siginficance since the discovery that this population is (primarily) made up of X-ray binaries accreting at super-Eddington rates, a result that has been spectacularly confirmed with the detection of coherent pulsations from a growing number of ULXs (requiring neutron star accretors, despite their extreme luminosities). The *NuSTAR* observatory has played a major role in this effort, initially providing the first view of ULXs in the hard X-ray band (E > 10 keV), contributing the first detection of pulsations in a ULX (M82 X-2), and now allowing broadband spectral variability studies to be undertaken. Throughout 2017 we undertook a major, multi-epoch observing campaign on the well-known 'extreme' ULX (L ~ 1e40 erg/s) NGC1313 X-1, combining *XMM-Newton* (800 ks), *Chandra* (500 ks) and *NuSTAR* (500 ks). I will present early results from this large co-ordinated campaign, focusing on the unusual broadband spectral variability exhibited. Remarkably, we find evidence that the thermal emission that dominates the ~2-10 keV band exhibits two distinct L ~ T^4 tracks, implying the presence of two stable radii in the inner accretion flow, separated by a factor of ~4. The source appears to jump between these different radii at different epochs. I will discuss possible interpretations for this strange behaviour, and place the broadband variability seen from NGC1313 X-1 in the context of that seen from the broader ULX sample to date.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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