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*on **29 Jan 2019; 16:57 UT***
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Subjects: X-ray, Binary, Black Hole, Transient

Referred to by ATel #: 12456, 12457, 12470, 12477, 12480, 12491, 12497, 12505, 12520, 13459, 13465, 13539

On 2019 January 26 at 03:16 UT, MAXI/GSC detected the new X-ray transient MAXI J1348-630 (ATel #12425), which was then quickly also observed by Swift/BAT (GCN #23795, #23796, #23797, #23801), INTEGRAL (GCN #23799, ATel #12441), iTelescope.Net T31 (ATel #12430), and the 1-m LCO telescope at Cerro Tololo (ATel #12439). Based on a 1 ks Swift/XRT observation, a coherent signal was reported around 9.8 s (or perhaps at 4.9 s), suggesting that MAXI J1348-630 may harbor an X-ray pulsar (ATel #12434). Here we report on NICER observations of MAXI J1348-630.

NICER observed MAXI J1348-630 for a total of ~8.1 ksec between 2019 January 26 20:40 UT and January 28 20:34 UT. The source flux is seen to increase systematically over this time interval, and in an observation performed on January 28 NICER detected an average of 5398 cts/sec (0.2-12 keV). The fast increase is consistent with the flux increase detected by MAXI (see link here) and Swift/BAT (see link here).

The 2-10 keV power spectrum is dominated by strong broadband noise (37% rms in the 0.1-64 Hz range on Jan 26, decreasing to 32% rms on Jan 28), characteristic of black hole X-ray binaries in the hard state. No periodic signal is detected at the frequencies of the reported 9.8 s or 4.9 s periods, but there is marginal (<3σ) evidence for a pair of weak (5-10% rms) non-harmonically-related QPOs on similar timescales, just above the low-frequency break of the broadband noise, at

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frequencies beginning at ~0.15 Hz in the first NICER observations on Jan 26 and moving to > 0.3 Hz in the most recent observations. We can compare the broadband power spectral shape with those obtained for a large sample of RXTE observations of accreting black holes and neutron stars, using â power colorâ ratios of integrated power from different frequency bands (see link here for the diagram including MAXI J1348-630, and for more details see Gardenier & Uttley 2018, MNRAS 481, 3761). The source power colors clearly lie along the track followed by black holes.

The continuum X-ray spectrum (0.6-10 keV), after applying the Crab correction to deal with unmodelled systematics (see, e.g., Ludlam et al. 2018, ApJL 858, L5), could be approximated with an absorbed power-law plus disk-blackbody model. The absorption column density was measured at n_H = 0.66(1)E22 cm^-2, comparable to the integrated H column density of 1.5E22 cm^-2 from the Leiden/Argentine/Bonn maps. We find that during January 26-28 the power-law photon index Gamma steepens from 1.66(1) to 1.84(2) while the disk blackbody temperature kT increases from 0.27(2) keV to 0.37(3) keV. The absorbed 0.6-10 keV flux increased from 6.2(2)E-9 erg cm^-2 s^-1 up to 2.26(2)E-8 erg cm^-2 s^-1. We observed residuals in the energy range 6-7 keV, likely associated with a weak iron reflection feature.

The timing and spectral properties of MAXI J1348-630 strongly suggest that it is a black hole X-ray binary in a rapidly evolving hard state. Due to the rapid rise in flux, we advise urgency in scheduling follow-up observations at other wavelengths. Further NICER observations of this source are underway; additional multi-wavelength observations are strongly encouraged.

NICER is a 0.2-12 keV X-ray telescope operating on the International Space Station. The NICER mission and portions of the NICER science team activities are funded by NASA.

References: Gardenier & Uttley 2018, MNRAS 481, 3761; Ludlam et al. 2018, ApJL 858, L5

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