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NICER follow-up observations of the transient system Swift J1728.9-3613

ATel #12455; *T. Enoto (Kyoto Univ.), D. Altamirano (Univ. of Southampton), P. M. Bult, K. C. Gendreau, Z. Arzoumanian, T. E. Strohmayer (NASA/GSFC), P. S. Ray (NRL), S. Guillot (IRAP/CNRS/CNES), G. K. Jaisawal (DTU Space), P. Uttley (Univ. of Amsterdam), J. Homan (Eureka Scientific and SRON) and the NICER team*

on 30 Jan 2019; 04:17 UT

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Subjects: X-ray, Black Hole, Transient

Referred to by ATel #: [12502](#)

Following reports of the new Galactic transient Swift J1728.9-3613 (MAXI J1728-360) reported by Swift and MAXI (ATel #[12436](#), #[12437](#), #[12445](#), GCN #[23800](#)), NICER started follow-up observations from 15:20 UT 2019 January 29. The source count rate is ~600 count/s in the 1-10 keV energy band during the first three orbits (~840 s exposure). The average source count rate is nearly constant over the three orbits.

The 1-10 keV X-ray spectrum is approximated by an absorbed power-law model after applying a Crab correction to deal with instrumental uncertainties (see, e.g. Ludlam et al. 2018, ApJL 858, L5). A column density of $N_{\text{H}}=3.86(1)e+22$ cm⁻² and photon index of 2.69(1) are obtained from preliminary fitting (reduced chi-square of 1.70 with 615 d.o.f.). The fit is improved when adding a blackbody component in soft X-rays (reduced chi-square of 1.16 with 613 d.o.f.). The best fitting parameters are $N_{\text{H}}=3.42(3)e+22$ cm⁻², Photon index=2.40(3), and $kT=0.67(1)$ keV. The absorbed X-ray flux is estimated to be $4.4(1)e-9$ ergs/cm² in the 1-10 keV. The quoted errors are statistical 1-sigma range.

A preliminary timing analysis showed band-limited variability below 1 Hz and a narrow QPO at 5.5 Hz. Fitting the power spectrum with a superposition of Lorentzian profiles, we measured the amplitude of the band-limited noise at 11.7(2)% rms, with a break frequency of 0.034(2) Hz. The QPO was detected at 6 sigma significance, with an amplitude of 4.1(6)% rms, width 0.5(2) Hz and centroid frequency 5.46(5) Hz. No excess power was observed at higher frequencies.

The shape of the average power spectrum is reminiscent of that observed when black hole X-ray binaries display Type-B QPO. If this interpretation is correct, then Swift J1728.9-3613 is a black

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hole candidate currently in the soft-intermediate state. This interpretation implies that we missed the rise of the outburst. Further observations both in X-rays and at other wavelengths are needed to test this interpretation.

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.

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