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Publication date
2017

Document Version
Final published version

Published in
The astronomer's telegram

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2 Nov 2018; 12:42 UT

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Initial NICER observations of a broadened iron line and QPOs in MAXI J1535â 571

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*on **22 Sep 2017; 04:07 UT***
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Subjects: X-ray, Binary, Black Hole

Referred to by ATel #: 10816, 11020

NICER has observed the new X-ray transient MAXI J1535â 571 (GCN #21788, ATels #10699, #10700, #10702, #10704, #10708, #10711, #10714, #10716, #10734, #10745) several times from 2017 September 9 through September 20. Over this time the flux has grown from 3E-8 ergs/cm^2/s to 1.2E-7 ergs/cm^2/s (2-10 keV). The heavily absorbed source had a NICER count rate grew from 3200 to 17,000 counts per second over this period. We fit the time-averaged 1-9.5 keV spectrum of 5.4 ksec of MAXI J1535â 571 data taken on September 13 with a model consisting of a disk blackbody and relativistic reflection including an intrinsic power-law (relxill), modified by interstellar absorption (tbabs).Â A number of Gaussian â linesâ were included in the model to account for instrument-related residuals that will be corrected in later calibrations.Â We measured a column density of N_H = (4.89 +/- 0.06)E+22 cm^-2; this is about twice the value derived from Swift data (ATel #10731).Â The disk parameters were kT = 0.58 +/- 0.03 keV, with a normalization of K = 1.6 (+0.1,-0.4) E+4.Â The reflection fraction was 1.3 +/- 0.2, the iron abundance was A_Fe = 2.0 (+0.1,-0.4), and the ionization parameter of the disk was constrained to be log(xi) = 3.7 (+0.1,-0.2).Â Parameters related to the inner disk and the black hole are of special interest.Â The black hole spin parameter was a = 0.88 (+0.1,-0.2), and the inner disk inclination was i = 27 (+1,-5) degrees.Â These fits assumed a radial emissivity profile with a broken power-law form, with power-law indices q1 = 6 (+1,-4) and q2 = 2.2 +/- 0.1, and a break radius r_break = 5.5 (+0.9,-0.3) GM/c^2. Â We note that preliminary fits to subsequent spectra yielded consistent values for the black hole spin and the inner disk inclination.Â With this particular model, we infer an absorbed source flux of 6.1 E-8 erg/cm^2/s, and an unabsorbed flux of 1.7 E-7 erg/cm^2/s in the 0.5-10.0 keV band.Â Significant variations on time scales ranging from a second to several hundred seconds are clearly visible in the 0.2-12 keV NICER light curves. To quantify this variability further, we extracted an average Leahy normalized (mean noise level of 2) power density spectrum from two observation periods

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betweenÂ September 12, 10:53:39 andÂ September 13, 22:40:40, totaling about 15 ksec in duration. The overall shape of both power spectra can be characterized as a flat-top at the lowest frequencies (< 0.2 Hz) breaking into a power-law above 0.2 Hz and becoming constant (noise) above roughly 30 Hz. We see a clear set of low-frequency QPOs superimposed on the power-law portion of the power spectrum. The centroid of the lower frequency QPO drifts between 1.9 and 2.8 Hz (Coherence, Q = 6) and the centroid of the second drifts between 3.8 and 5.6 Hz (Q = 3). The centroid frequencies of the two QPOs are always in a 1:2 ratio. The fractional root-mean-squared amplitude of the two QPOs is 6% and 5%, respectively. We stress that the instrument calibration is preliminary, that backgrounds have been neglected given the extremely high source flux, and that these fits should be regarded as an initial characterization of the data.

10708 Further brightening of the X-ray transient MAXI J1535-571, suggesting the presence of a black hole

10704 Erratum to ATel #10702: MAXI J1535-571 optical counterpart coordinates

10702 Discovery of the optical counterpart of MAXI J1535-571

10700 MAXI J1535-571: Swift detection and localization

10699 MAXI/GSC discovery of a new hard X-ray transient MAXI J1535-571

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