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Continuing NICER observations of the state transition in ASASSN-18ey/MAXI J1820+070

ATel #11823; *J. Homan (Eureka Scientific and SRON), P. Uttley (Univ. of Amsterdam), K. Gendreau, Z. Arzoumanian (GSFC), M. Saylor (KBRwyle), J. F. Steiner, D. Pasham (MIT), A. L. Stevens (Michigan State Univ.), D. Altamirano (Southampton), E. Kara (Univ. of Maryland), A. C. Fabian (Univ. of Cambridge), S. Eikenberry (Univ. of Florida) for the NICER team*

on 6 Jul 2018; 23:16 UT

Credential Certification: jeroen@space.mit.edu

Subjects: X-ray, Black Hole, Transient

Referred to by ATel #: [11827](#), [11831](#), [11887](#), [11899](#), [11936](#), [12068](#)

Following the onset of a rapid state transition in the black hole transient ASASSN-18ey/MAXI J1820+070 (ATel #[11820](#)), NICER has been observing the source with a very high cadence (see left panel in figure linked at the end of this telegram). The new NICER observations show that in the past 24 hours, the 0.2-12 keV count rate (scaled to 52 active Focal Plane Modules) has increased from ~41000 cts/s around July 5 22:00 UTC to 66000 cts/s (>6 Crab in rate) around July 6 19:20 UTC. During this period the spectral hardness decreased smoothly.

The (type C) low-frequency QPO that we reported in ATel #[11820](#) increased in frequency from ~3.8 Hz on July 5 22:00 UTC to 6.4 Hz on July 6 11:45 UTC, while it significantly weakened. Around 14:45 UTC the QPO was only marginally detected around 8 Hz, although its harmonic at ~16 Hz could still be seen clearly.

A rapid jump in count rate (from ~57000 cts/s to ~63000 cts/s) occurred during the time interval of July 06 16:05-16:16 UTC. This sudden increase in count rate was not accompanied by a strong change in hardness. However, after the count rate jump a type-B QPO appeared in the power spectrum, around 4.4 Hz. This type-B QPO was still present in our most recent observation (July 6 19:20 UTC), but had decreased in frequency to 3.4 Hz.

The power-spectral and spectral evolution suggest that the source has now moved to the soft intermediate state. This is confirmed by quantifying the 5-10 keV power-spectral shape in terms of ratios between integrated power in different frequency bands (see right panel in linked figure and Heil et al. MNRAS, 448, 3339 (2015) for details), for comparison with black hole transients observed by RXTE. Based on past observations of transitions between the hard and soft intermediate states in black hole transients, we expect that significant evolution should be taking place in the radio through optical, as the result of changes in the jet emission, including the possible launching of ballistic jets (see Fender et al., MNRAS, 396,1370 (2009)).

Related

- 12534 [MAXI J1820+070 is close to quiescence](#)
- 12157 [MAXI 1820+070 has completed the decline from the recent optical re-brightening following the soft to hard transition](#)
- 12128 [Optical brightening of MAXI J1820+070 over the soft to hard transition observed with LCO and the AI Sadeem Observatory](#)
- 12068 [MAXI J1820+070 continuing its rapid evolution toward the hard state](#)
- 12064 [Swift observes MAXI J1820+070 in transition from the soft to the hard-intermediate state](#)
- 12061 [AMI radio detection of the black hole candidate MAXI J1820+070 during the soft to hard transition.](#)
- 12057 [MAXI/GSC detection of a rapid increase in the hard X-ray flux of MAXI J1820+070](#)
- 11960 [The 55 Hz signal we detected in MAXI J 1820+070 is not a QPO](#)
- 11951 [Detection of a 55 Hz high-frequency QPO in MAXI J1820+070 with NICER](#)
- 11936 [Optical timing observations of MAXI J1820+070 with IFI+IQUEYE and AQUEYE+ soon after state transition](#)
- 11899 [Short-lived episodes of emission line splitting in the candidate black hole X-ray binary MAXI 1820+070](#)
- 11887 [LOFAR observations of MAXI J1820+070 \(ASASSN-18ey\) during its recent state transition](#)
- 11855 [Polarimetric monitoring of the MAXI J1820+070 in optical and near-infrared wavelengths](#)
- 11833 [Declining near-infrared flux from the black-hole candidate MAXI J1820+070 \(ASASSN-18ey\) in transition](#)
- 11831 [\(Sub\)-millimetre Observations of MAXI J1820+070 \(ASASSN-18ey\) Suggest Jet Quenching on July 6](#)

NICER plans to make observations this coming weekend at the times provided (<https://www.dropbox.com/s/d25xapanoab7a8m/nicerobservationtimes.txt?dl=0>). Coordinated observations are 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

Light/hardness curves and power-color diagram

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