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


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

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on 6 Jul 2018; 23:16 UT

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Subjects: X-ray, Black Hole, Transient

Refereed to by ATel #: 11827, 11831, 11887, 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 6 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)).
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*
ATel #11823: Continuing NICER observations of the state transition in ASASSN-18ey/MAXI J1820+070

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