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X-ray re-brightening detected from the neutron star transient XTE J1701-407

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on 22 Sep 2011; 06:58 UT

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Subjects: X-ray, Binary, Neutron Star, Transient

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Following our recent report on the transition to quiescence of the transient neutron star low-mass X-ray binary XTE J1701-407 (ATel #3604), we continued to monitor the source in X-rays. Further observations were carried out between August 31 and September 20, during which Swift pointed towards the source once every 2-4 days with the XRT operated in the photon counting mode. Initially, we found the 2-10 keV luminosity of XTE J1701-407 to be steadily decreasing, down to $L_x \sim 1E33$ erg/s on August 31 (assuming a distance towards the source of $D=5$ kpc; ATel #2814). However, subsequent observations obtained between September 3-12 show that the 2-10 keV luminosity varied irregularly, increasing up to $L_x \sim 1E34$ - $1E35$ erg/s. In this intensity range, the Swift/XRT spectra can be described by an absorbed powerlaw model with a joint hydrogen column density of $N_H = (4.0 \pm 1.0)E22$ cm⁻² and photon indices ranging from ~ 2.5 - 3.3 . The individual Swift/XRT observations show considerable variation in the source intensity between different satellite orbits (i.e., on a time scale of hours). In the most extreme case, the 2-10 keV luminosity increased from $L_x < 1E33$ erg/s on September 8 between 02:48-07:45 UTC to $L_x \sim 1E35$ erg/s on September 8 between 22:02-22:12 UTC, thus a variation of 2 orders of magnitude within ~ 16 hours.

We obtained a 28-ks Chandra/ACIS-S observation of XTE J1701-407 on September 15. The source had considerably brightened by that time, causing the Chandra data to become piled-up. The X-ray spectrum extracted from the readout streak, which should not be affected by pile-up, can be fit with an absorbed powerlaw model yielding $N_H = (3.0 \pm 0.4)E22$ cm⁻² and a photon index of 1.4 ± 0.2 . The corresponding 2-10 keV luminosity of $L_x \sim 1E36$ erg/s (for $D=5$ kpc) is comparable to the outburst intensity displayed by the source in the past three years (ATel #3604). The pile-up corrected

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spectra of our latest three Swift/XRT observations, performed on September 16, 18 and 20, yield similar spectral parameters and fluxes as deduced from the Chandra data. This suggests that the source has returned to outburst level after a low-intensity state that endured for ~5 weeks. The apparent transition to quiescence and subsequent recovery to outburst is reminiscent of that reported for some other transient neutron star low-mass X-ray binaries (e.g., HETE J1900.1-2455 and SAX J1750.8-2900; ATels #1106 and #1777).

A detailed analysis of these observations will be presented elsewhere.

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534	Estimated Distance to HETE J1900.1-2455
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