Black hole candidate GRS 1739-278 is exhibiting an unusual, long-duration quasi-steady hard state

Parikh, A.S.; Wijnands, R.; Degenaar, N.; Altamirano, D.

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ATel #11869; *A. S. Parikh, R. Wijnands, N. Degenaar (UvA), D. Altamirano (Southampton)*
*on **19 Jul 2018; 07:28 UT***
Credential Certification: Aastha Parikh (A.S.Parikh@uva.nl)

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GRS 1739-278 is a black hole candidate that was first detected in outburst in 1996 (Paul et al., 1996). This outburst lasted ~11 months. In 2014 March it experienced a new outburst (Krimm et al., 2014). The main 2014 outburst of GRS 1739-278 lasted for ~1.2 years and was subsequently followed (see Yan & Yu, 2017a) by several rebrightenings (which are episodes of increase in the flux after the end of the main outburst although they never reach a maximum flux similar to that during the peak of the main outburst).

After the final Neil Gehrels Swift Observatory/X-ray Telescope (Swift/XRT) observation reported by Yan & Yu (2017a), Swift continued to monitor the source, albeit less frequently than before. In February 2017 the source was still detected although at a low level (Yan & Yu, 2017b; ATel #10137). We requested observations using the Swift/XRT to establish the source activity level ~1.25 years after the end of the last reported observation by Yan & Yu (2017b; ATel #10137). Our observation of 2018 May indicated that the source was still active at a low level having a (0.5-10 keV) count rate of ~0.6 c/s. We requested more XRT observations to confirm and follow the current activity status of the source. Our first follow-up observation was performed on 2018 July 18 and the source was detected at a very similar count rate level as during the 2018 May observation.

We analysed the source spectra extracted from our two currently available XRT observations by fitting an absorbed power-law model. We fixed the equivalent hydrogen column density to Nh = 2.5E22 cm^{-2} (Yan & Yu, 2017a). The fits indicated a photon index Γ = 1.6 +/- 0.3 which suggests that the source is in the so-called black hole hard state. The unabsorbed flux is ~5E-11 $erg/cm^2/s$ (0.5-10 keV) which corresponds to an unabsorbed luminosity of ~4E35 erg/s (0.5-10 keV, assuming a distance of 7.5 kpc; Yan & Yu, 2017a). This is similar to the flux level of the 2017 February observation reported in ATel #10137. We found that the source was in the field-of-view of several XRT pointings between February 2017 and our newly requested observations and the source was consistently detected at very similar fluxes. Therefore, it appears that the source has been in a quasi-steady state for about ~1.5 years now.

The current quasi-steady state is not representative of the quiescent level of the source since a pre-outburst XRT observation, observed on 2012 May 13, did not detect the source. The (0.5-10 keV) count rate upper limit derived from this observation is <4E-2 c/s (using the 90% prescription by

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Gehrels, 1986), which is a factor of >15 lower than the count rate we detected in our recent XRT observations. Such a quasi-steady low level state is unusual for black-hole X-ray transients. Multi-wavelength observations are necessary in order to get more insight into the physical process(es) at work during this state. We will continue to monitor the source using the XRT once every month until it is Sun constrained in 2018 November.

We thank the Swift team for scheduling our observations.

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