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Continued Swift/XRT observations of the new Galactic center transients SWIFT J174540.2-290037 and SWIFT J174540.7-290015

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Continued Swift/XRT observations of the new Galactic center transients SWIFT J174540.2-290037 and SWIFT J174540.7-290015

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on 28 Jun 2016; 11:08 UT

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Subjects: Radio, X-ray, Binary, Black Hole, Neutron Star, Transient

Referred to by ATel #: [9236](#), [9551](#), [10323](#), [10900](#), [13150](#)

Daily monitoring observations of the Galactic center performed with the Swift/XRT show continued activity of the transient X-ray source SWIFT J174540.2-290037, which was first detected on 2016 May 28 and is located $\sim 10''$ to the south of Sgr A* (ATel #9109). Following its initial detection, the XRT (PC mode) count rate of this source gradually rose to ~ 0.8 c/s around mid June. The XRT count rate has been lower, ~ 0.3 - 0.4 c/s, for the past few days.

A spectrum extracted from a 1.0-ks observation obtained in WT mode on June 22 suggests that near the peak intensity, the source spectrum could be described by an absorbed power-law model with $N_H = (1.6 \pm 0.2)E^{23} \text{ cm}^{-2}$ and a photon index of 1.9 ± 0.2 (1-sigma errors). The implied unabsorbed 2-10 keV flux is $(3.8 \pm 0.3)E^{-10} \text{ erg/cm}^2/\text{s}$. For a distance of 8 kpc this translates into a 2-10 keV luminosity of $(2.9 \pm 0.2)E^{36} \text{ erg/s}$. An averaged spectrum extracted from the two most recent PC-mode observations, obtained on June 25 and 27, suggest that the spectrum can currently be described with $N_H = (1.7 \pm 0.5)E^{23} \text{ cm}^{-2}$ and a photon index of 1.5 ± 0.5 , yielding an unabsorbed 2-10 keV flux of $(1.2 \pm 0.2)E^{-10} \text{ erg/cm}^2/\text{s}$ (1-sigma errors). The current 2-10 keV luminosity is $(9.2 \pm 0.9)E^{35} \text{ erg/s}$ for a distance of 8 kpc.

Due the brightening and increased number of observations, we can now obtain an improved position for SWIFT J174540.2-290037. For this purpose we utilize the online XRT data products tool (Evans et al. 2007, 2009), using all PC-mode observations obtained between May 28 and June 27 (amounting to 22.5 ks of exposure time). This yields a standard XRT position of R.A. = 17:45:40.60 and Dec. = -29:00:36.4 (J2000) with an uncertainty of $3.5''$ (90% confidence), and an UVOT-enhanced position of R.A. = 17:45:40.38 and Dec. = -29:00:42.8 (J2000) with an

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uncertainty of 1.9" (90% confidence; see Goad et al. 2007; Evans et al. 2009). The improved localization is $\sim 10''$ from the Chandra position of the 7.9-hr eclipsing transient LMXB and black hole candidate CXOGCJ174540.0-290031 (e.g., Munro et al. 2005), which makes an association unlikely.

The nearby X-ray transient SWIFT J174540.7-290015 that was discovered earlier this year and is located $\sim 16''$ to the north of Sgr A* (ATel #8649), continues to be active to date. We extracted an averaged spectrum from the latest two PC-mode observations (June 25 and 27), which suggest that the spectral data can currently be described with an absorbed power-law with $N_H = (7.0 \pm 0.5)E^{22} \text{ cm}^{-2}$ and a photon index of 2.4 ± 0.9 (1-sigma errors). The unabsorbed 2-10 keV flux for this fit is $(2.1 \pm 0.6)E^{-11} \text{ erg/cm}^2/\text{s}$, which corresponds to a luminosity of $(1.6 \pm 0.5)E^{35} \text{ erg/s}$ for a distance of 8 kpc. Up till now, there are no notable features in the XRT light curves such as bursts or eclipses for either of the two unclassified Swift X-ray transients.

The neutron star LMXB AX J1745.6-2901, seen active since 2013 July 18 (ATel #5222), faded into the XRT background around 2016 June 3. Summing all PC-mode observations obtained between June 3 and 23 yields a 2-10 keV flux upper limit of $\sim 1.2E^{-12} \text{ erg/cm}^2/\text{s}$, assuming an absorbed power-law spectrum with $N_H = 2E^{23} \text{ cm}^{-2}$ and an index of 2.6 (e.g., Degenaar et al. 2014). This upper limit is relatively high due to contamination of SWIFT J174540.2-290037, which is $\sim 1'$ away. This flux translates into a luminosity upper limit of $\sim 9E^{33} \text{ erg/s}$ at 8 kpc and suggests that AX J1745.6-2901 has likely transitioned to quiescence after an outburst that lasted for almost 3 yr.

The Swift Monitoring Campaign website can be found at: <http://www.swift-sgra.com>

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