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A Further X-ray Flare from Sgr A* Detected by Swift

ATel #13007; *Mark Reynolds (University of Michigan), Nathalie Degenaar (University of Amsterdam), Rudy Wijnands (University of Amsterdam), Jon Miller (University of Michigan), Jamie Kennea (Penn State University), on behalf of a larger collaboration.*

on 9 Aug 2019; 00:11 UT

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Subjects: Radio, Millimeter, Sub-Millimeter, Far-Infra-Red, Infra-Red, X-ray, Black Hole

Referred to by ATel #: [13023](#), [13039](#)

We report the detection of a large X-ray flare, in a 1.1ks XRT observation on 2019-08-07 (11:56UT; obsid: 00095329112), originating from the direction of Sgr A* during regular monitoring observations with the Neil Gehrels Swift Observatory (Degenaar+ 2015, JHEA 7, 137).

The flaring source is observed to be variable (0.02 ct/s -- 0.13 ct/s) with a net average count rate of $5.21e-02 \pm 0.01$ ct/s, facilitating basic spectral fitting. Assuming a fixed column density of $9.1e22 \text{ cm}^{-2}$ (Degenaar+ 2015) and fitting with a power-law in the 2 - 10 keV bandpass, we measure (68% confidence)

Gamma: 1.15 ± 0.46
 norm: $(2.2 -1.1 +2.1)e-3$

resulting in an absorbed flux of $\sim 1.6e-11 \text{ erg/s/cm}^2$ (2-10 keV), or a luminosity of $\sim 1.2e35 \text{ erg/s}$ for an assumed distance of 8 kpc. The position of the source of this flare is nominally consistent with the position of Sgr A*, and the properties of previous flares observed by Swift from Sgr A* (atel #[12768](#), #[11313](#), Degenaar et al. 2013, ApJ 769, 155).

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We note that this flare is the 4th X-ray flare observed by Swift in the past 100 days from a region consistent with the known position of Sgr A*. These include 2 flares that are above the average long term flux at more than the 3 sigma level of confidence (see atel #12768) and 2 further lower flux flares that are above the long-term average at significances between 2-3 sigma.

Do et al. (2019, ApJL, in press; arXiv:1908.01777) have reported on Keck observations of a dramatic change of the variability properties of Sgr A* in the nIR during 2019, including an observation of the largest nIR flare to date. The Swift monitoring program observations would suggest that the observed evolution of the nIR flaring properties of Sgr A* is matched by a change in the 2 - 10 keV X-ray band flaring properties. This would be consistent with the known correlated nIR-X-ray variability properties of the Sgr A* accretion flow (e.g., Eckart et al., 2012, A&A, 537, 52).

A paper presenting the results of a detailed analysis of the long term evolution of the flaring properties of Sgr A*, as observed during the Swift Galactic center monitoring program, is under preparation.

Our daily Swift X-ray monitoring campaign of the Galactic center will continue throughout 2019. Updates on new observations are immediately posted at the Swift Sgr A* Monitoring Campaign Website (<http://swift-sgra.com/>).

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