## Continued Swift Monitoring of the Galactic Center Flare

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# Continued Swift Monitoring of the Galactic Center Flare

ATel #5016; ***M. T. Reynolds, N. Degenaar, J. M. Miller (Michigan), J. A. Kennea (Penn State), R. Wijnands (Amsterdam) on behalf of a larger collaboration***
*on **26 Apr 2013; 20:36 UT***
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Referred to by ATel #: 5222



We report the result of a long Swift observation of the galactic center flaring source (atel #5006, #5008, #5011, #5013, #5014) undertaken last night (2013-04-25; obsid: 00554491001; Exptime: 11.2 ks). Continued elevated X-ray emission consistent with the position of Sgr A* is detected, where a count rate of 0.095+/-0.003 ct/s is measured from a 10" radius region centred on the radio position of Sgr A*.

The measured intensity is consistent with a roughly constant level of approximately 0.1 ct/s over the past 48 hrs from this source, e.g., atel #5006.

Extracting the source spectrum from this region and background from an annulus extending from 20"-50" from the position of Sgr A*, we have a total of 1060 net counts. All fits are reported in the 2-10 keV bandpass and errors where quoted are at the 90% confidence level.

The source spectrum is intrinsically soft and thermal-like. Fixing the column density to that measured towards Sgr A* (9.1e22 cm^-2), we find curved residuals when the spectrum is fit with a power-law (Gamma ~ 2). Allowing the column density to vary results in an improved fit but the resulting spectral tends towards Gamma ~ 4.

Our nominal best fit model is a simple blackbody

Nh: 9.1e22 cm^-2
kT: 1.06+/-0.06 keV
norm: (4.1+/-0.2)e-4

though alternative models that naturally produce curvature in the 2 -- 10 keV band pass also return acceptable fits, e.g., Bremsstrahlung. The normalization implies an emission region with a radius of ~ 16m (d/8kpc)^2.

The spectrum does not reveal any evidence for the presence of Fe K emission intrinsic to the source, suggesting the tentative Fe K line detection reported in atel #5011 originates in the diffuse gas that permeates the GC region, e.g., Baganoff et al. (2003), Nowak et al. (2012).

Inspection of the lightcurve reveals the source to be highly variable, with typical variations at the 10% level. There is no evidence for any periodicity and/or eclipses as might be exected from an X-ray binary in the lightcurve. The resulting power spectrum is featureless and consistent with

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stochastic variability from this source.

The observed spectral shape is not consistent with that typically observed from NS & BH LMXB at luminosities ~ 1e35 erg/s. If this spectrum were due to emission from a NS/BH LMXB, such high temperatures are only observed from sources accreting at a significant fraction of the Eddington limit ~0.1 LEdd, which implies a line-of sight source lying at a distance far in excess of the galactic center.

Given the positional coincidence with Sgr A* and the unusual spectrum, it is possible that we are observing emission from Sgr A* at a low Eddington fraction. If so, the current event is the longest and most energetic accretion event observed from Sgr A* in modern times.

Definitive association of the observed X-ray emission with Sgr A* will require high resolution X-ray observations.

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Swift is carrying out a daily monitoring campaign throughout 2013 to study the evolution of the X-ray properties of Sgr A* as it interacts with the G2 cloud (Gillessen et al., 2012, 2013). All observations are promptly analyzed and the resulting X-ray lightcurve will be made publicly available at the link below.

*Swift Sgr A* monitoring Campaign Website*

5013 Possible brightening at 22 GHz of Sgr A*

5011 Swift XRT spectrum of transient X-ray source at Sgr A*'s position

5009 Swift/BAT detection of an SGR-like flare from near Sgr A*

5008 Ongoing X-ray activity from Sgr A*

5006 Large Flare from Sgr A* Detected by Swift

4923 Non-detection of flare at 22 GHz of Sgr A* induced by the approaching G2 cloud in February and March 2013

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4471 1E 1740.7-2942 (the Great Annihilator) enters a low-intensity state

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2770 Swift/XRT detects new outbursts of the galactic center X-ray transients GRS 1741-2853 and XMM J174457-2850.3

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904 Announcement of the Swift/BAT Hard X-ray Transient Monitor

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