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Quiescent X-ray observations of Swift J1858.6-0814

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*on **10 May 2020; 19:12 UT***
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The low-mass X-ray binary Swift J1858.6-0814 has been in outburst since October 2018 (ATel #12151). Observations of type-I X-ray bursts from the source showed that this low-mass X-ray binary hosts a neutron star (ATel #13563).

We have been monitoring this source using the X-ray telescope (XRT) on board the Neil Gehrels Swift Observatory since late March 2020. Recent observations demonstrate that the source has been transiting to quiescence. This has also been seen using optical observations obtained by the Las Cumbres Observatory (ATel #13719).

Our XRT coverage of Swift J1858.6-0814 shows that the source exhibited a count rate of ~0.06 c/s around 8 April 2020, which is a strong decrease as compared to its outburst count rate of ~0.9 c/s on 27 March 2020. Since then the source has continued exhibiting a low flux level.

Our four most recent XRT observations of Swift J1858.6-0814 (obtained over a time span of ~2 weeks, with the last one obtained on 6 May 2020) exhibited a similar count of ~0.01 c/s. We have extracted a combined spectrum from these observations (obsID: 00010970056-00010970059). Fitting this spectrum with an absorbed power-law model, we find a photon index of Gamma ~2.8+/-0.7 (and the equivalent hydrogen column density was found to be Nh~0.7E22 cm^(-2)). Alternatively, the source spectrum can be fitted with an absorbed black-body or neutron star atmosphere model with temperatures of ~520 eV and ~152 eV, respectively (and corresponding Nh of ~0.1E22 cm^(-2) and ~1.0E22 cm^(-2)). These spectral fits show that the source currently has an X-ray luminosity of ~(2-5)E34 erg/s (0.5-10 keV, unabsorbed, assuming d = 15 kpc; ATel #13563).

We have additional XRT coverage approved to monitor the further evolution of the source. In addition, Swift J1858.6-0814 is a promising candidate to probe dense matter physics in neutron star crusts by potentially observing and monitoring the cooling evolution and an accretion-heated neutron star crust. Thus, we have triggered our approved crust cooling proposal (PI Wijnands) and we will obtain our first Chandra observation in the week of 18 May 2020.

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