Swift/XRT localization of the neutron star X-ray transient SAX J1806.5-2215

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*on **2 Mar 2011; 18:38 UT***
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Subjects: X-ray, Binary, Neutron Star, Transient

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Following reports of renewed activity of the transient neutron star low-mass X-ray binary SAX J1806.5-2215 (ATel #3193), we obtained a ~1 ks Swift/XRT pointing of the source field on 2011 March 1. The observation was carried out in the PC mode and reveals one relatively bright X-ray source within the XRT field of view. For this object, we find an astrometrically corrected X-ray position (using the method described by Evans et al. 2009, MNRAS 397, 1177) of RA, Dec = 271.63564, -22.23767 deg, which is equivalent to RA, DEC (J2000) = 18 06 32.55, -22 14 15.6, with an uncertainty of 2.0 arcsec (radius, 90% confidence). This position lies ~1 arcmin from the BeppoSAX/WFC coordinates of SAX J1806.5-2215, which is well within the estimated ~2.9 arcmin BeppoSAX/WFC error circle.

The XRT spectrum (corrected for pile-up) can be fitted to an absorbed powerlaw model with Nh~(5.6+/-1.8)E22 cm-2 and an index of ~2.0+/-0.5. The deduced absorbed and unabsorbed fluxes in the 2-10 keV energy band are ~1.6E-10 and 2.7E-10 erg cm-2 s-1, respectively. For a distance of 8 kpc (the upper limit derived from type-I X-ray burst analysis; Cornelisse et al. 2002, A&A 392, 931), the unabsorbed flux translates into a 2-10 keV luminosity of ~2E36 erg s-1.

SAX J1806.5-2215 was discovered with the WFC aboard BeppoSAX in 1996 through the detection of type-I X-ray bursts (in 't Zand et al. 1998, NuPhS 69, 228). The WFC detected two of these bursts, in 1996 August and in 1997 March. Although BeppoSAX could not detect any persistent emission at that time, RXTE/ASM observations suggest that the source was active from early-1996 till late-1997 at a 2-10 keV luminosity of ~1E36 erg/s (Cornelisse et al. 2002, A&A 392, 931). Apart from this long outburst, no activity is seen in the RXTE/ASM lightcurve, nor in the RXTE/PCA bulge scans (see

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ATel #3193). This suggests that SAX J1806.5-2215 resided in quiescence for nearly 15 years (at least, no similarly long, bright outbursts occurred since 1997). The intensity level detected during our Swift/XRT observation is similar to that seen by RXTE/ASM in 1996/1997.

There is no quiescent counterpart detected at the refined source position in an archival Chandra observation obtained in 2001 October (Cornelisse et al. 2002, A&A 392, 931). Applying the prescription for low number statistics given by Gehrels (ApJ 303, 1986), we place a 90% confidence upper limit on the unabsorbed quiescent 0.5-10 keV luminosity of ~(0.5-1)E33 erg s-1 for D=8 kpc (using webpimms with a hydrogen column density of Nh=5.6E22 cm-2 and two different models: a powerlaw of index 2.0 and a blackbody of temperature 0.3 keV). Previous Swift/XRT observations of the source field obtained in 2006 October, 2007 February (Campana 2009, ApJ 699, 1144) and 2010 June did not detect a source at the XRT position obtained for SAX J1806.5-2215. This implies that the 0.5-10 keV source luminosity was roughly below ~2E33 erg s-1 on those dates.

Follow-up observations, particularly at other wavelengths, are strongly encouraged.

We thank the Swift team for making this observation possible. This work made use of data supplied by the UK Swift Science Data Centre at the University of Leicester.

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