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We report nearly-simultaneous radio and X-ray observations of the newly discovered X-ray transient MAXI J0911-635/Swift J0911.9-6452 in the globular cluster NGC 2808 (ATel #8872, #8884). These observations indicate the accretor is likely a neutron star.

Following its detection, we triggered a NAPA program on the ATCA (C2902, PI:Sivakoff) and requested contemporaneous Swift observations. We carried out ATCA observations between 05:22 UT and 07:57 UT on 2016 April 4, for a total on-source integration time of 2.1h, using two 2-GHz basebands centred at 5.5 and 9 GHz. The array was in a compact configuration (H214), with a resolution of 4.2"x0.7" on the longest baselines. No source was detected within the 90% Swift/XRT error circle (ATel #8884), down to a 5 sigma upper limit of 70 μJy. Assuming a flat radio spectrum, this upper limit corresponds to a 5 GHz luminosity of 4.5e28 erg/s ($L = 4 \pi d^2 \nu S_\nu$;) at the distance of NGC 2808 (10.4kpc; Correnti et al. 2016, arXiv:1603.05254).

Our Swift/XRT observation was taken an hour after the ATCA observations, between 08:52:29 and 09:00:58 UT in WT mode, with the source having a 0.5-10 keV count rate of 3.72+/-0.10 cnt/s. The spectrum can be well fit by an absorbed power-law, typical of X-ray binaries in a hard accretion state. We find an absorption column density N_H = (7.7+/-1.5)e21 cm^{-2} (abundances from Wilms et al., 2000, ApJ 542, 914; cross sections from Verner et al., 1996, ApJ, 465, 487), photon index 1.85+/-0.16, and unabsorbed 1-10 keV X-ray flux of (2.40+/-0.15)e-10 erg $cm^{-2}s^{-1}$

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(90% confidence; χ_{red}^2 = 0.9, 46 dof). This corresponds to an X-ray luminosity of ~3.1e36 erg/s in the 1-10 keV band at 10.4 kpc, or ~1.8% of the Eddington limit of a 1.4 solar mass neutron star.

Since the expected absorption column density towards NGC 2808 is N_H = 1.9e21 cm^{-2} (following Bahramian et al. 2015, MNRAS, 452, 3475), our X-ray spectrum indicates that either the source is intrinsically absorbed or that the spectrum is not an absorbed power-law. We therefore tried an absorbed disk blackbody model (more consistent with soft/thermal state accretion), finding an absorption column density N_H = (3.8+/-1.0)e21 cm^{-2}, disk temperature of 1.5+/-0.2 keV, and unabsorbed 1-10 keV X-ray flux of (1.9+/-0.1)e-10 erg cm^{-2}s^{-1}. The fit is statistically better (χ_{red}^2 = 0.8 for 46 dof) than the powerlaw fit. The implied projected inner disk radius is small (1.4+/-0.3 km), which would imply a high inclination angle. The flux corresponds to an X-ray luminosity of ~2.5e36 erg/s in the 1-10 keV band at 10.4 kpc, or ~1.4% of the Eddington limit of a 1.4 solar mass neutron star.

Typical soft-to-hard transitions occur at bolometric luminosities of 2% of the Eddington luminosity (Maccarone 2003, A&A, 409, 697). Hard-to-soft transitions generally occur near the peaks of outbursts, except in the case of outbursts that do not have soft states. The luminosity here is slightly below 2% Eddington, albeit without bolometric corrections. Additionally, soft states are more susceptible to inclination angle effects than hard states, and this could be an indication that the source is a high inclination angle system. If the source continues to rise in X-ray flux, that would argue against this scenario, and instead favor a hard state with some absorption intrinsic to the source.

From the most recent plot of the radio/X-ray correlation for black hole and neutron star systems (Deller et al., 2015, ApJ, 809, 13) and the radio upper limit, we suggest that MAXI J0911-635 is either a typical neutron star low-mass X-ray binary or a radio-quiet accreting millisecond pulsar.

Further radio observations are planned.

We thank the ATNF and Swift staff for the rapid scheduling of the observations.
