# ATCA radio detection of MAXI J1535-571 indicates it is a strong black hole X-ray binary candidate

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# ATCA radio detection of MAXI J1535-571 indicates it is a strong black hole X-ray binary candidate

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*on **6 Sep 2017; 04:06 UT***
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Subjects: Radio, X-ray, Black Hole, Transient

Referred to by ATel #: 10714, 10716, 10745, 10761, 10768, 10816, 11020, 11611



MAXI J1535-571 is a newly discovered Galactic hard X-ray transient (GCN #21788, ATels #10699, 10700). Following its identification as a potential hard-state low-mass X-ray binary (ATel #10702) and a potential black hole system (ATel #10708), we conducted target of opportunity observations of this source with the Australia Telescope Compact Array (ATCA).

We observed MAXI J1535-571 with ATCA on 2017 September 05 (scans on source between 10:28-12:24 UT; MJD 58001.48 +/- 0.04). The observations were taken simultaneously at 5.5 and 9.0 GHz, with a bandwidth of 2 GHz at each frequency. The array was in its 1.5 km (1.5A) configuration, providing angular resolutions of 3.3 x 3.9 arcseconds at 5.5 GHz and 2.0 x 2.4 arcseconds at 9 GHz. We used 1934-638 for primary flux calibration and 1511-55 (3.03 degrees away) for phase calibration. The data were reduced using standard routines in Miriad (Sault et al. 1995), before being imaged in CASA (McMullin et al. 2007) using a natural weighting scheme to maximize sensitivity.

We significantly detected a radio source at a position consistent with the X-ray and optical localisations (ATels #10699, 10700, 10704). We measured flux densities of the radio source to be 7.39 +/- 0.03 mJy and 7.74 +/- 0.05 mJy at 5.5 and 9.0 GHz, respectively (statistical errors only). The radio spectral index of alpha = 0.09 +/- 0.03 (where S_nu $\propto$ nu$^{alpha}$) is consistent with emission from a compact radio jet.

Our best radio position (measured at 9.0 GHz) is:

RA (J2000) = 15:35:19.7141 +/- 0.007 Dec (J2000) = -57:13:47.5826 +/- 0.024,

where the error bars are statistical. A similar position was measured at 5.5 GHz.

We assume the source is as close to the Galactic centre as possible along its l = 323.724 deg line-of-sight. Thus we estimate its distance is about 6.5 kpc. At this lower distance (compared to 8

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kpc) our radio detection provides a 5 GHz radio luminosity of (2.053 +/- 0.008)*1e30 * (d/6.5 kpc)$^2$erg/s. X-ray spectral analyses (ATel #10708) of the source just a few hours before our ATCA radio observations measured the source at an X-ray luminosity of 5.7e37 erg/s (d/6.5 kpc)$^2$erg/s (2-10 keV). The observed radio emission at this X-ray luminosity places MAXI J1535-571 firmly above the expected radio luminosities of all known neutron star X-ray binaries (see e.g., Tetarenko at al. 2016, for a recent review), and within the expected range for black hole X-ray binaries, lying near the radio-faint track, at similar X-ray luminosities (see e.g., Gallo et al. 2003, Corbel et al. 2011, for further details). This indicates that this source is a strong black hole X-ray binary candidate.

The JACPOT XRB collaboration are planning to continue monitoring this outburst.

Further multi-wavelength observations of this source are highly encouraged.

We thank ATNF staff for rapidly scheduling these observations.

**10708** Further brightening of the X-ray transient MAXI J1535-571, suggesting the presence of a black hole
**10704** Erratum to ATel #10702: MAXI J1535-571 optical counterpart coordinates
**10702** Discovery of the optical counterpart of MAXI J1535-571
**10700** MAXI J1535-571: Swift detection and localization
**10699** MAXI/GSC discovery of a new hard X-ray transient MAXI J1535-571

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