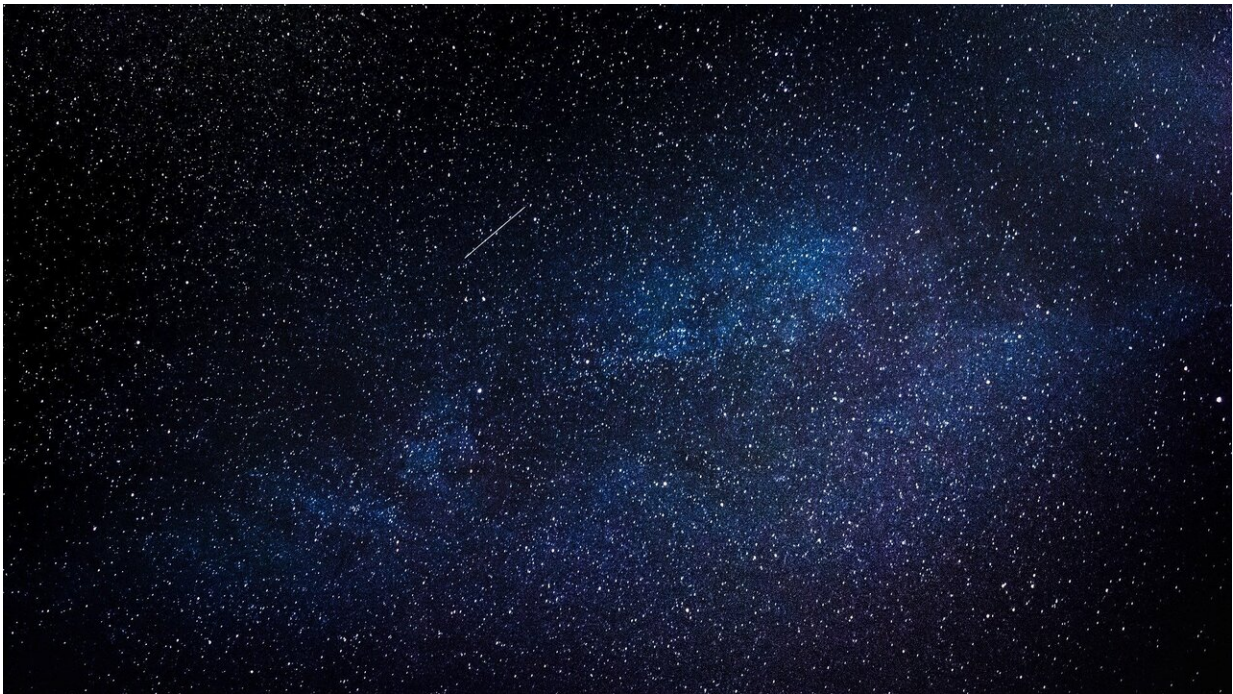


# New transient X-ray source detected in the galaxy NGC 4945

July 16 2020, by Tomasz Nowakowski

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Using the Suzaku satellite, Japanese astronomers have detected a transient X-ray source in a nearby galaxy known as NGC 4945. The newly discovered source, designated Suzaku J1305–4930, appears to be a black hole binary. The finding is detailed in a paper published July 8 on the arXiv pre-print repository.

At a distance of about 12.1 million light years from the Earth, NGC 4945 is a [spiral galaxy](#) hosting one of the brightest active galactic nuclei (AGN) in the hard X-ray band. Previous observations of this galaxy have identified several bright X-ray sources, including ultra-luminous X-ray sources (ULXs).

Now, a team of astronomers led by Shuntaro Ide of Osaka University reports the detection of a new transient X-ray source in NGC 4945 almost reaching the luminosity required to classify it as a ULX. The discovery was made using the X-ray Imaging Spectrometer (XIS) onboard the Japanese Suzaku spacecraft.

"Among the seven Suzaku observations of this region, the source was detected in four observations from July 2010 to August 2010," the astronomers wrote in the paper.

Suzaku J1305–4930 was identified some 9,800 [light years](#) away from the nucleus of NGC 4945. The highest observed 0.3–10 keV X-ray luminosity of this source reached 890 undecillion erg/s, while the temperature at its inner-disk radius was about 1.12 keV. On its last detection in August 2010, the 0.3–10 keV X-ray luminosity of Suzaku J1305–4930 decreased to approximately 220 erg/s and the temperature at the inner-disk radius was measured to be around 0.62 keV.

The research found that the innermost disk radius of Suzaku J1305–4930 is around three times the Schwarzschild radius and its mass is about 10 solar masses. According to the astronomers, these results, together with the measured luminosity, suggest that Suzaku J1305–4930 is a stellar-mass black-hole binary.

"If Suzaku J1305–4930 is a stellar-mass black-hole binary in NGC 4945, it means that we have serendipitously obtained multiple observations with relatively short intervals in between of a source of this class outside

our Galaxy," the researchers added.

Furthermore, the results suggest that during the four observations conducted in 2010, Suzaku J1305–4930 was not in the standard-disk state but in the slim-disk state. The astronomers suppose that the source have undergone a transition from the standard-disk to the slim-disk state. Such transition have been reported by previous studies for other galactic black hole binaries like XTE J1550–564 and GRO J1655–40.

"Their Ldisk vs Tin diagrams exhibit clear state transitions from the standard-disk state to the slim-disk state. Our results on Suzaku J1305–4930 may alternatively be interpreted with a similar state transition," the authors of the paper explained.

**More information:** Ide et al., Discovery of a transient X-ray source Suzaku J1305-4930 in NGC 4945, arXiv:2007.04465 [astro-ph.HE] [arxiv.org/abs/2007.04465](https://arxiv.org/abs/2007.04465)

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