

Star ripped apart by black hole in rare discovery

March 6 2024, by Roy Gal

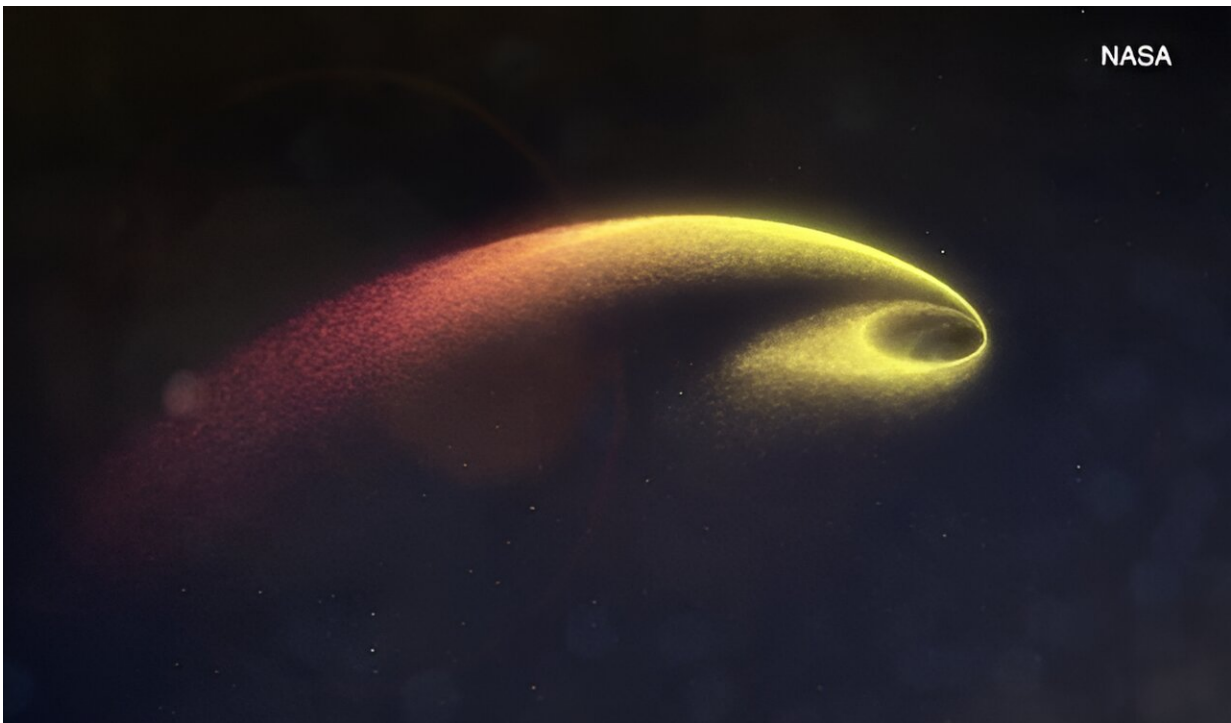


Illustration of star remnants after it is shredded by a supermassive black hole.
Credit: NASA

Astronomers from the University of Hawai'i Institute for Astronomy (IfA) have uncovered the closest recorded occurrence of a star being torn apart by a supermassive black hole (SMBH). Using the All-Sky Automated Survey for Supernovae (ASAS-SN) system, on February 22,

2023, the team detected a sudden surge in brightness followed by a rapid dimming in the galaxy NGC 3799, located about 160 million light-years from Earth.

"While black holes destroying stars have been seen before, this is the first one we have seen this close using visible light," said Willem Hoogendam, an IfA graduate student who co-led the research. "This could give us a much better understanding of how SMBHs grow and collect material around them."

Follow-up observations were taken with IfA's Asteroid Terrestrial Last Alert System (ATLAS) telescopes on Maunaloa and Haleakalā, W.M. Keck Observatory on Maunakea, and other ground- and space-based observatories. Hoogendam, working with fellow IfA grad student Jason Hinkle and faculty advisor Ben Shappee, analyzed these data to determine that the burst of brightness was caused by a Tidal Disruption Event (TDE).

TDEs happen when a star gets too close to a SMBH and is torn apart by its strong gravitational force, with the black hole devouring the star's mass. Research findings will be published in the *Monthly Notices of the Royal Astronomical Society*.

"This discovery suggests that black holes ripping stars apart nearby could be more common than previously thought—we just haven't witnessed it happening frequently," said Hoogendam.

Rare find

The intense brightness produced by the star's mass feeding the black hole creates a luminous flare, which all-sky surveys like ASAS-SN can observe. While such events have been detected far away from Earth, finding one relatively close by is rare. ASASSN-23bd, as the event is

known, is a remarkable nearby TDE, making it an excellent subject for further study.

The [astronomers](#) found that ASASSN-23bd was unlike many other TDEs they had observed before:

- It emitted much less energy than previous TDEs
- It was the closest TDE discovered using visible light
- Its change in [brightness](#) happened about twice as fast as most TDEs
- ASASSN-23bd is in a unique category of objects known as low luminosity and Fast TDEs

Provided by University of Hawaii at Manoa

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