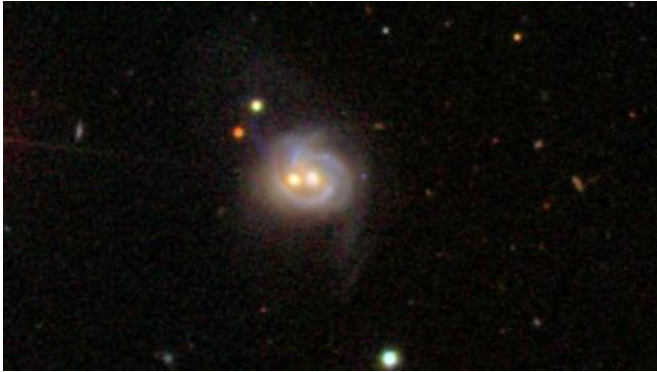


# Nearby galaxy boasts two monster black holes, both active

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Viewed in visible light, Markarian 739 resembles a smiling face, with a pair of bright cores underscored by an arcing spiral arm. The object is really a pair of merging galaxies. Data from Swift and Chandra reveal the eastern core (left) to be a previously unknown AGN; past studies already had identified an AGN in the western core. The two supermassive black holes are separated by about 11,000 light-years. The galaxy is 425 million light-years away. Credit: Credit: SDSS

(PhysOrg.com) -- A study using NASA's Swift satellite and the Chandra X-ray Observatory has found a second supersized black hole at the heart of an unusual nearby galaxy already known to be sporting one.

The galaxy, which is known as Markarian 739 or NGC 3758, lies 425 million light-years away toward the [constellation Leo](#). Only about 11,000 light-years separate the two cores, each of which contains a black hole gorging on infalling gas.

The study will appear in a forthcoming issue of *The Astrophysical Journal Letters*.

*Video: Zoom into Markarian 739, a [nearby galaxy](#) hosting two monster [black holes](#). Using NASA's Swift and Chandra, astronomers have shown that both black holes are producing energy as gas falls*

*into them. The object is only the second-known binary active galactic nucleus within half-a-billion light-years. (No audio. Animation begins with visible light view of Markarian 739 and transitions into an artistic rendering of the two black holes. Credit: NASA's Goddard Space Flight Center)*

"At the hearts of most large [galaxies](#), including our own Milky Way, lies a supermassive black hole weighing millions of times the sun's mass," said Michael Koss, the study's lead author at NASA's Goddard Space Flight Center in Greenbelt, Md., and the University of Maryland in College Park (UMCP). "Some of them radiate billions of times as much energy as the sun."

Astronomers refer to galaxy centers exhibiting such intense emission as active galactic nuclei (AGN). Yet as common as monster black holes are, only about one percent of them are currently powerful AGN. Binary AGN are rarer still: Markarian 739 is only the second identified within half a billion light-years.

Many scientists think that disruptive events like galaxy collisions trigger AGN to switch on by sending large amounts of gas toward the black hole. As the gas spirals inward, it becomes extremely hot and radiates huge amounts of energy.

Since 2004, the Burst Alert Telescope (BAT) aboard Swift has been mapping high-energy X-ray sources all around the sky. The survey is sensitive to AGN up to 650 million light-years away and has uncovered dozens of previously unrecognized systems. Follow-up studies by Koss and colleagues published in 2010 reveal that about a quarter of the Swift BAT AGN were either interacting or in close pairs, with perhaps 60 percent of them poised to merge in another billion years.

"If two galaxies collide and each possesses a supermassive black hole, there should be times

when both black holes switch on as AGN," said coauthor Richard Mushotzky, professor of astronomy at UMCP. "We weren't seeing many double AGN, so we turned to Chandra for help."

Swift's BAT instrument is scanning one-tenth of the sky at any given moment, its X-ray survey growing more sensitive every year as its exposure increases. Where Swift's BAT provided a wide-angle view, the X-ray telescope aboard the Chandra X-ray Observatory acted like a zoom lens and resolved details a hundred times smaller.

For decades, astronomers have known that the eastern nucleus of Markarian 739 contains a black hole that is actively accreting matter and generating prodigious energy. The Chandra study shows that its western neighbor is too. This makes the galaxy one of the nearest and clearest cases of a binary AGN.

The distance separating the two black holes is about a third of the distance separating the solar system from the center of our own galaxy. The dual AGN of Markarian 739 is the second-closest known, both in terms of distance from one another and distance from Earth. However, another galaxy known as NGC 6240 holds both records.

How did the second AGN remain hidden for so long? "Markarian 739 West shows no evidence of being an AGN in visible, ultraviolet and radio observations," said coauthor Sylvain Veilleux, a professor of astronomy at UMCP. "This highlights the critical importance of high-resolution observations at high X-ray energies in locating binary AGN."

Provided by NASA's Goddard Space Flight Center

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