New X-ray source in nearby galaxy spawns mystery

January 9 2008

X-ray sources appear and disappear in the nearby galaxy Centaurus A. Astronomers at Ohio State University and their colleagues detected a new X-ray source in the galaxy in 2007 using NASA's Chandra X-ray Observatory. The new source -- likely a binary star system that contains a black hole -- appears in the center of the image. Credit: Animation by Gregory Sivakoff, courtesy of Ohio State University

Astronomers studying a nearby galaxy have spied a rare type of star system -- one that contains a black hole that suddenly began glowing brightly with X-rays.

Though this type of star system is supposed to be rare, it's the second such system discovered in that galaxy, called Centaurus A.

The discovery suggests that astronomers have more to learn about the lives and deaths of massive stars in galaxies such as our own.

Normally when astronomers study Centaurus A, it's the giant X-ray jets emanating from the heart of the galaxy that steal the show, explained Gregory Sivakoff, a postdoctoral researcher in astronomy at Ohio State University. The jets extend from the galaxy for 13,000 light years in different directions.

But when his team studied Centaurus A with NASA's Chandra X-ray Observatory starting in March 2007, they saw a new X-ray source -- much smaller than the X-ray jets, but still glowing brightly. The source wasn't there during the last survey of the galaxy in 2003, but it shined throughout the time of the new observations, from March to May of 2007.

Because it hadn't been seen before, the astronomers classified the object as a “transient” X-ray source, meaning that the object had been there before 2007, but had only recently brightened enough to stand out.

Sivakoff discussed the results in a press briefing Wednesday, January 9, 2008 at the American Astronomical Society meeting in Austin, Texas.

The newly bright object, dubbed CXOU J132518.2-430304, is most likely a binary star system, the researchers concluded. The two stars likely formed at the same time, with one much more massive than the other. The more massive star evolved more quickly, and collapsed to form a black hole. It is now slowly devouring its companion. Such binary systems are thought to be extremely rare.

But this is the second bright, transient X-ray binary system discovered in Centaurus A -- and that's the problem, Sivakoff said.

“When we look at other galaxies like Centaurus A, we don't see these bright, transient X-ray binaries,” he said. “But now we've found two such objects in Centaurus A, and the implication is that we may not understand these objects as well as we thought we did.”

“So right now, our discovery is actually pointing to a puzzle rather than a solution.”

Because Centaurus A is near to our galaxy, astronomers have long hoped to use it as a Rosetta stone for studying other galaxies with black holes.

As astronomers piece together an explanation for the existence of the newly-discovered binary system, they may gain a better understanding of how black holes form from massive stars and how binary systems evolve.

“These binary systems are signposts of the massive stars that once existed in galaxies like Centaurus A. To understand the massive stars, we must first know how to read the signs,” he said.

Source: Ohio State University

Citation: New X-ray source in nearby galaxy spawns mystery (2008, January 9) retrieved 1 May 2024 from https://phys.org/news/2008-01-x-ray-source-nearby-galaxy-spawns.html

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