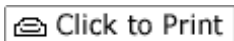




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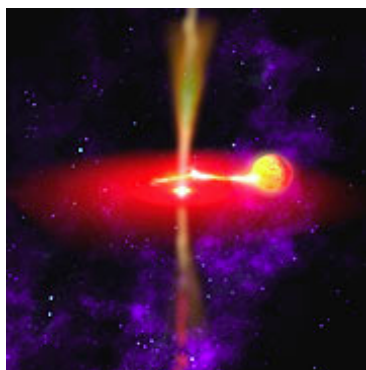


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# Black hole is a space-bender, and mind-bender

By Dan Vergano, USA TODAY

SAN DIEGO — A close-up peek at a black hole shows gravity twisting space in ways Einstein never considered, astronomers reported Monday.



Extreme gravity causes light to stretch as a spinning black hole drags the fabric of space around with it.

NASA

Black holes — collapsed stars with gravity so strong that even light cannot escape — have long fascinated cosmologists.

"Black holes are the best place to study gravity in the extreme," says Jon Miller of the Harvard-Smithsonian Center for Astrophysics. He presented the findings at the American Astronomical Society meeting.

His team made what could be the first direct observation of a black hole changing the dimensions of space. Scientists saw a gravity wave twisting the dust disk surrounding the hole. The wave actually bends space, so anything falling into the hole would perceive its

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descent as a straight drop, but far-off observers would see an elongated, sideways slide.

Named GRS 1915, the black hole weighs 10 times as much as our sun and is about 40,000 light-years away (one light-year equals about 5.9 trillion miles).

The "space-time wave" indicates the black hole is spinning, something never considered in Einstein's theory of gravity, which famously explains how the mass of stars and planets bends space. The black hole's disk is heated by the acceleration of dust pulled at several million miles per hour into the maw of the collapsed star, producing X-rays measured by NASA's Rossi X-ray Timing Explorer satellite.

Black holes made a lot of news at the astronomy meeting. Another team, from Goddard Space Flight Center and Oxford University, reports the first detection of "hot spots" rapidly circling a much more distant, and heavier, black hole. Astronomers are unsure whether they are three small stars or dense bits of dust heated by the hole's magnetic field.

"The properties of space (and) time near black holes is one of the most fundamental problems in astrophysics," says physicist Frederick Lamb of the University of Illinois at Urbana-Champaign. "These are pioneering new results."

The studies will aid in the design of X-ray telescopes used to test the limits of Einstein's theory of gravity, Lamb says.

A third black-hole study described Monday involved the discovery of a "swarm" of small black holes at the center of our Milky Way galaxy. The swarm was spotted by NASA's Chandra X-ray Observatory satellite, and the finding suggests small black holes congregate at the center of galaxies, usually orbiting a central super-size black hole. The Milky Way galaxy has its own massive black hole, Sagittarius A\*, perhaps 4 million times heavier than the sun.

Thousands of smaller black holes likely circle Sagittarius A\*, says Michael Muno of the University of California-Los Angeles, who presented the findings.

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