New source of intense gamma radiation discovered in Milky Way galaxy by UCSD astrophysicists

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NEW SOURCE OF INTENSE GAMMA RAYS DISCOVERED IN MILKY WAY GALAXY BY UCSD ASTROPHYSICISTS

A new source of intense gamma radiation, spewing enough radiation to power 50,000 suns, has been uncovered by astrophysicists at the University of California, San Diego.

The source is similar to the so-called "Great Annihilator" which many believe is a black hole near the center of the Milky Way galaxy, about 25,000 light years from Earth.

By comparison, the new gamma ray source appears to be a relatively close 1,800 light years away.

"It's not very catchy, but I tend to call this the 'off- center source,'" said Michael S. Briggs, a research physicist with UCSD's Center for Astrophysics and Space Sciences (CASS), who announced the discovery today at the annual meeting of the American Astronomical Society in Seattle.

Despite its less-than-glamorous nickname, the new source is likely to spur a renewed search for other gamma ray sources, produced when electrons and positrons (anti-electrons) collide and are annihilated. Until now, most of the attention has been directed toward what many believe to be a black hole near the galactic center.

A black hole is a collapsed star, whose gravitational pull is so strong it draws other stars and matter, including light, into its core.

"We now have two examples of this class of object (in the galaxy) and we expect to find many more," said Jim Matteson, a leading gamma ray authority at CASS.

"This is very important," he added. "It is a fundamental discovery in astrophysics."

The existence of this new gamma ray source remained hidden for more than a decade in the voluminous data obtained from the HEAO-1 (the first High-Energy Astronomy Observatory) spacecraft, whose observations took place from 1977-78.

Four years ago, Briggs began searching through the HEM) data as part of his Ph.D. dissertation. The painstaking search for a single source of intense gamma radiation was obscured by background radiation, however.

"The whole HEAO spacecraft was glowing and giving off gamma rays," he said. "And it's difficult to separate the good ones coming from sources in the sky to false events in your detectors."

New techniques, including the development of advanced software, allowed Briggs to separate the background radiation from the new "compact" source of radiation -- one with an energy of about 511,000 electron volts. This number represents a characteristic "signature" for gamma rays created by the mutual annihilation of electrons and positrons, their antimatter equivalents.

Initially, the UCSD scientists speculated the gamma ray source to be a known white dwarf star, V1223 SGR. A white dwarf represents the terminal stage in the life of an average star, with a surface temperature of about 8,000- to 10,000-degrees Centigrade.

According to the early theory, the energy seen in the HEAO data was being created by the white dwarf gobbling up a nearby companion star.

But others, including Matteson, contend that the gravitational pull of a white dwarf generally isn't strong enough to capture the amount of material needed to generate that much energy. The estimated temperature of the source is 350 million degrees Centigrade. By comparison, the surface temperature of the sun is about 6,000-degrees Centigrade.

"If it isn't the white dwarf, then it must be a neutron star (a highly dense star about 30 miles in diameter) or a black hole," said Briggs.

"At the moment, there is really no way to decide what the explanation is."

This fall, UCSD researchers and others are scheduled to travel to Australia to survey the galactic center from balloons using both imaging cameras and detectors designed for high- resolution spectral studies. Meanwhile, the gamma-ray telescope aboard the Soviet satellite GRANAT, and a high-energy gamma-ray detector aboard NASA's Gamma Ray Observatory, also are expected to study the region.

Recent observations suggest the "Great Annihilator" brightens and dims, strengthening the theory that it is a black hole. According to this theory, the flickering on and off of gamma rays coincides with stars and other material being sucked into the black hole.

Partly as a result of the discovery of a second gamma ray source, the researchers also plan to turn their attention to other regions of the sky.

"This discovery has turned up the fire a little on us now (to look for these new sources)," said Matteson. "We know a lot better now what we are looking for."

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