Gamma rays from galactic center could be evidence of dark matter

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(Phys.org) -- Gamma-ray photons seen emanating from the center of the Milky Way galaxy are consistent with the intriguing possibility that dark-matter particles are annihilating each other in space, according to research submitted by UC Irvine astrophysicists to the American Physical Society journal *Physical Review D*.

Kevork Abazajian, assistant professor, and Manoj Kaplinghat, associate professor, of the Department of Physics & Astronomy analyzed data collected between August 2008 and June 2012 from NASA's Fermi Gamma-ray Space Telescope orbiting Earth. They found more gamma-ray photons coming from the Milky Way galactic center than they had expected, based on previous scientific models. Gamma-rays are electromagnetic radiation emitted during radioactive decay or other high-energy particle processes.

"This is the first time this new source has been observed with such high statistical significance, and the most striking part is how the shape, spectrum and rate of the observed gamma rays are very consistent with the leading theories for dark matter," Abazajian said. "Future observations of regions with less astrophysical emission, such as dwarf galaxies, will be able to conclusively determine if this is actually from the dark matter."

Nonluminous and not directly detectable, dark matter is thought to account for 85 percent of the universe's mass. Its existence can only be inferred from its gravitational effects on other, visible matter. The UCI

researchers' findings could support its presumed presence at the center of galaxies.

The prevailing hypothesis is that dark matter is composed of weakly interacting massive particles, or WIMPs. When two WIMPs meet, they annihilate each other to produce more familiar particles – including gamma rays.

Although the data interpretation seems to be consistent with dark-matter theory, the gamma rays could be coming from a source other than WIMP destruction, Kaplinghat noted. "The signal we see is also consistent with photons emitted by pulsars," he said, "or from high-energy particles interacting with gas in the galactic center."

Provided by University of California, Irvine