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An Unexpected Journey: The Implications of the Detection of Continuum Energy Gamma-rays Consistent with Dark Matter Annihilation in the Galactic Center

Friday 1 February 2013 16:30 (25 minutes)

It has been known for some time that the center of the Milky Way Galaxy would be the most luminous source of gamma-ray photons from dark matter annihilation. Our recent work shows that observations by the Fermi Gamma-ray Space Telescope reveal that Galactic Center (GC) has a source with large luminosity and high statistical significance that is consistent with extended emission from dark matter annihilation in three ways: (1) its spatial morphology is consistent with that expected from numerical simulations; (2) its luminosity is consistent with the expected thermal-production dark matter annihilation rate; and (3) its energy spectrum is consistent with annihilation into standard model quark channels for weak-scale dark matter particle masses. The very crowded region of the GC also harbors a high density of other astrophysical high-energy sources, including millisecond pulsars, that could mimic this signal. I will discuss the details of the observation, its several interpretations, its implications, and the potential future resolution of the nature of this source.

Presenter: ABAZAJIAN, Kevork

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