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Dark Matter Interpretation of the Galactic Center Gamma Ray Excess

Friday, 1 June 2018 14:00 (30 minutes)

The Milky Way's Galactic Center harbors a gamma-ray excess that is a candidate signal of annihilating dark matter. Dwarf galaxies remain predominantly dark in their expected commensurate emission. In this talk I will discuss the degree of consistency between these two observations, quantified through a joint likelihood analysis. Doing so will incorporate Milky Way dark matter halo profile uncertainties, as well as an accounting of diffuse gamma-ray emission uncertainties in dark matter annihilation models for the Galactic Center Extended gamma-ray excess (GCE) detected by the Fermi Gamma-Ray Space Telescope. The preferred range of annihilation rates and masses expands when including these unknowns. Even so, using two recent determinations of the Milky Way halo's local density leave the GCE preferred region of single-channel dark matter annihilation models to be in strong tension with annihilation searches in combined dwarf galaxy analyses. This joint likelihood analysis allows us to quantify this inconsistency. This analysis allows for testing dark matter annihilation models' consistency within this combined dataset. As an example, we test a representative inverse Compton sourced self-interacting dark matter model, which is consistent with both the GCE and dwarfs.

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