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Cosmic Rays from Heavy Dark Matter from the Galactic Center

The gamma-ray fluxes observed by the High Energy Stereoscopic System (HESS) from the J1745-290 Galactic Center source is well fitted by the secondary photons coming from dark matter (DM) annihilation in particle-antiparticle standard model pairs over a diffuse power-law background. The spectral features of the signal are consistent with different channels: light quarks, electro-weak gauge bosons and the top-antitop channel. The amount of photons and morphology of the signal require compressed DM profiles as those resulting from baryonic contraction, which provides large enhancements in the signal over DM alone simulations. The fits return a heavy WIMP, with a mass above 10 TeV, but well below the unitarity limit for thermal relic annihilation. The fitted background spectral index is compatible with the Fermi-Large Area Telescope (LAT) data from the same region. This possibility can be tested with future observations of other cosmic rays, whose amount and spectrum is unambiguously predicted for each channel. For example, high energy neutrinos could confirm this hypothesis at IceCube or ANTARES for angular resolutions smaller than 1° .

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