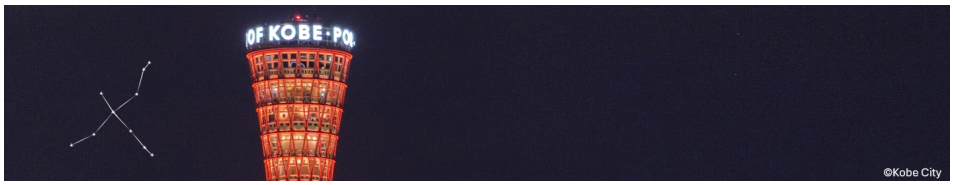

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The 20 GeV Fermi halo: evidence for dark matter annihilation?

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Fifteen years of the Fermi Large Area Telescope (LAT) data in the halo region of the Milky Way (MW) are analyzed to search for gamma rays from dark matter annihilation. Gamma-ray maps within the region of interest (|l| < 60 deg, 10 deg < |b| < 60 deg) are modeled using known components plus a halo-like component. A statistically significant halo-like excess is found with a spectral peak around 20 GeV, and examination of the fit residual maps indicates that a spherically symmetric halo component fits the map data well. The radial profile agrees with annihilation by the smooth NFW density profile. Various systematic uncertainties are investigated, but the 20 GeV peak remains significant. The halo excess spectrum can be fitted by annihilation with a particle mass m ~ 0.5-0.8 TeV and cross section <sigma v> ~ (5-8) x10^{-25} cm3 s^-1 for the bb channel. This cross section is larger than the upper limits from dwarf galaxies and the canonical thermal relic value, but considering various uncertainties, especially the density profile of the MW halo, the dark matter interpretation of the 20 GeV “Fermi halo”remains feasible. The prospects for verification through future observations are briefly discussed.

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