

The Fermi GeV Excess as a Tracer of Stellar Mass in the Bulge: Results with SkyFACT

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A persistent excess of gamma rays measured with the Fermi-LAT has been found towards the center of the Galaxy, typically referred to as the Galactic Center Excess (GCE). While its existence is well established, its nature and origin are still debated. While a simple but exotic origin for the GCE could be the annihilation of dark matter, other astrophysical origins, such as emission from millisecond pulsars, are currently more plausible. However, most gamma-ray analyses of the inner Galaxy suffer from incomplete background and foreground modeling that make it difficult to extract the morphology of the GCE and also formally yield poor fits to the data. In order to understand the effects of modeling systematics on the GCE, we use an analysis tool called SkyFACT, or Sky Factorization with Adaptive Constrained Templates. In contrast to standard approaches, SkyFACT combines techniques from image reconstruction and template fitting, and makes use of a likelihood that is regularized via the maximum entropy method to efficiently handle large numbers of nuisance parameters. We apply this tool to the inner Galaxy to robustly fit the spectrum and morphology of the GCE. We find that a model for the boxy bulge is strongly preferred over dark matter templates, and that the GCE luminosity scales with the stellar mass contained in this boxy bulge.

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