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Space Telescope



Fermi's view of the Galactic Center region

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An extremely complex and interesting region







What can be found in Fermi's energy range?

- A large number of **sources** (many of them unresolved)

- **Diffuse** gamma emission coming from interaction of cosmic rays with the interstellar gas and radiation fields:

IC (CRs interacting with ISRF)
Bremmstrahlung (CRs interacting with gas → dependence on whether target is neutral or ionized)

- Pion decays

- Potential **DM** emission??



Galactic longitude



N-body cosmological simulations have shown that large amounts of dark matter accumulate in the center of galactic halos.



Many extensions of the Standard Model predict the production of gamma rays coming from dark matter particles annihilations or decays Gamma-rays W*/Z/a WIMP Dark ?? Matter Particles ECM~100GeV W+/Z/0 Neutrinos + a few p/p, d/d Anti-matter

The center of our galaxy is the brightest and closest source of gamma rays coming from dark matter annihilation/decay, and therefore a very interesting target for dark matter searches



Emission coming from the Inner Galaxy comes from:

- Outer galaxy
- True inner galaxy
- Unresolved sources
- Point sources

The diffuse emission has to be worked out encompassing all components.

Use GALPROP to calculate **cosmic ray propagation** and **folding with ISM and ISRF** to calculate gamma rays distribution







Uncertainties in the diffuse gamma emission



CO becomes too dense towards GC to reliably trace H2



Uncertainties in the diffuse gamma emission





Fitting the diffuse gamma emission

- 45 x 45 degrees region around the GC

- 32 months of data (FRONT conversion)

- E>1GeV



Galactic Longitude (deg)



DATA - MODEL

Galactic Longitude (deg)



Fitting the diffuse gamma emission

Bright excesses after model subtraction compatible with 1FGL sources

- 15 x 15 degrees region around the GC

- 32 months of data (FRONT conversion)

- E>1GeV





The innermost 5 x 5 degrees





The innermost 5 x 5 degrees

PRELIMINARY RESULTS

- Spectral residuals flatter than those for previously reported analyses (arXiv:0912.3828).

- More accurate modeling of sources and better understanding of the LAT's response. These effects need to be **quantified**.

- Details in forthcoming paper





The innermost 5 x 5 degrees





The majority of the diffuse emission is removed using a physically-motivated model based on GALPROP

Peaks in residual emission consistent with known sources

Work in progress to characterize the low-level residual structures and point sources

Spectral residuals flatter than those for previously reported analyses

Forthcoming paper(s) will describe the method and results in detail