

Dissecting the inner Galaxy with gamma-ray pixel count statistics

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The nature of the GeV gamma-ray Galactic center excess (GCE) in the data of Fermi-LAT is still under investigation. Different techniques, such as template fitting and photon-count statistical methods, have been applied in the past few years in order to disentangle between a GCE coming from sub-threshold point sources or rather from diffuse emissions, such as the dark matter annihilation in the Galactic halo.

A major limit to all these studies is the modeling of the Galactic diffuse foreground, and the impact of residual mis-modeled emission on the results' robustness.

In Ref.[1], we combine for the first time adaptive template fitting and pixel count statistical methods in order to assess the role of sub-threshold point sources to the GCE, while minimizing the mis-modelling of diffuse emission components.

We reconstruct the flux distribution of point sources in the inner Galaxy well below the Fermi-LAT detection threshold, and measure their radial and longitudinal profiles. We find that point sources and diffuse emission from the Galactic bulge each contributes about 10% of the total emission therein, disclosing a sub-threshold point-source contribution to the GCE.

[1] arXiv:2102.12497

Reference to paper (DOI or arXiv)

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Primary author(s) : MANCONI, Silvia (TTK, RWTH Aachen)

Co-author(s) : Dr. CALORE, Francesca (LAPTh, Annecy); Prof. DONATO, Fiorenza

Presenter(s) : MANCONI, Silvia (TTK, RWTH Aachen)

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