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## Is there evidence for gamma-ray emission from the Sagittarius dwarf galaxy?

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More than a decade ago, the Large Area Telescope aboard the Fermi Gamma-ray Space Telescope unveiled the existence of two gigantic gamma-ray lobes known as the Fermi Bubbles. While their origin is still unknown, various studies identified intricate structures within the bubbles. One prominent region, the cocoon, has recently been associated with gamma-ray emissions from the Sagittarius dwarf spheroidal (Sgr dSph) galaxy.

In this talk, we present our ongoing research aiming to scrutinize the gamma-ray emissions linked to the Sgr dSph within the cocoon region using adaptive template fitting and pixel count statistics methods. Our approach introduces a substantial advancement in data interpretation by enabling a data-driven optimization of astrophysical background models, thereby significantly diminishing the inaccuracies resulting from background mis-modelling.

Our study focuses on the robustness of the previously reported gamma-ray emission of the Sgr dSph against our optimized background representations. We also investigate the proposed hypothesis that the gamma-ray emission from the Sgr dSph results from its resident population of millisecond pulsars by inspecting the flux distribution of point sources within the region.

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