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Observations and models of gamma-ray emission toward the Galactic Center the case of the Fermi GeV excess

Thursday, September 15, 2016 2:00 PM (20 minutes)

I will present recent results on the Galactic Center from the Fermi-LAT Collaboration using 6.5 years of LAT Pass 8 data, and comparisons with previous works. My talk will focus on our new analysis of the Galactic Center that includes the Fermi Bubbles in some detail; in particular I will show the effect on the previously reported Galactic excess from low-latitude emission from the Fermi Bubbles. As time permits I will explore other possible gamma ray sources. Implications for a dark matter model interpretation will be discussed along with other possible more conventional models.

Summary

The region toward the Galactic center emits gamma rays due to interactions of cosmic rays with interstellar gas and stellar radiation in the Milky Way, and numerous energetic objects along the line of sight. Based on the analysis of observations from the Large Area Telescope (LAT) on board the Fermi Gamma-ray Space Telescope, several groups have reported the detection of extended residual emission peaking at a few GeV toward the Galactic center in excess of conventional models for interstellar emission and known individual sources. For some time, this excess was claimed to be consistent with models of dark-matter annihilation. More recently alternative models such as a population of unresolved sources, e.g. millisecond pulsars, or systematic effects from imperfect modeling of interstellar emission have been proposed that can also explain this excess. We present an assessment of the uncertainties on the morphology and spectrum of the excess related to modeling the various components of gamma-ray emission in that region, using 6.5 years of LAT Pass 8 data. In particular we consider uncertainties in the distribution of interstellar gas along the line of sight, in the low-latitude emission from the Fermi bubbles, and in the abundance of cosmic-ray sources in the innermost Galaxy. The excess persists in all the models considered, though the spectrum varies significantly. We consider implications of the findings for potential interpretations of the excess.

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