

A Galactic Center Excess in the Andromeda Galaxy M31 Seen with the *Fermi*-LAT

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On behalf of the Fermi LAT Collaboration

The *Fermi* Large Area Telescope (LAT) has opened the way for comparative studies of cosmic-ray populations and high-energy sources in the Milky Way (MW) and in other external star-forming galaxies. Using more than seven years of LAT Pass 8 data in the energy range 0.1 – 100 GeV, M31 is detected at nearly 10σ and is observed to be extended at 4σ . Its spectrum is consistent with a power law and its spatial distribution is consistent with a uniform brightness disk over the plane of the sky and no offset from the center of M31. The emission appears confined to the inner regions of the galaxy and does not fill the disk of the galaxy. The non-correlation with regions rich in gas or star-formation activity suggests that the emission is not interstellar in origin, unless the energetic particles radiating in gamma rays do not originate in recent star formation. Alternative interpretations include a population of unresolved millisecond pulsars in the galaxy center or dark matter annihilation or decay, similar to what has been proposed to account for the Galactic center excess found in LAT observations of the MW.

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