

Evidence for Gamma-ray Jets in Our Milky Way

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Based on data from the Fermi Gamma-ray Space Telescope, we have discovered two gigantic gamma-ray emitting bubble structures in our Milky Way (known as the Fermi bubbles), extending ~ 50 degrees above and below the Galactic center with a width of ~ 40 degrees in longitude. The gamma-ray emission associated with these bubbles has a significantly harder spectrum ($dN/dE \sim E^{-2}$) than the inverse Compton emission from known cosmic ray electrons in the Galactic disk, or the gamma-rays produced by decay of pions from proton-ISM collisions. There is no significant difference in the spectrum or gamma-ray luminosity between the north and south bubbles. The bubbles are spatially correlated with the hard-spectrum microwave excess known as the WMAP haze; we also found features in the ROSAT soft X-ray maps at 1.5 – 2 keV which line up with the edges of the bubbles. The Fermi bubbles are most likely created by some large episode of energy injection in the Galactic center, such as past accretion events onto the central massive black hole, or a nuclear starburst in the last ~ 10 Myr. Study of the origin and evolution of the bubbles also has the potential to improve our understanding of recent energetic events in the inner Galaxy and the Galactic cosmic ray acceleration. Furthermore, we have recently identified a gamma-ray cocoon feature within the southern bubble, with a jet-like feature along the cocoon's axis of symmetry, and another directly opposite the Galactic center in the north. If confirmed, these jets are the first resolved gamma-ray jets ever seen.

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I will discuss the galactic jet in our milky way

Primary author: Dr SU, Meng Su (MIT)

Presenter: Dr SU, Meng Su (MIT)