

Cosmic Magnetism in Voids and Filaments



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Probing the intergalactic magnetic field through gamma-ray observations with the Fermi LAT and H.E.S.S.

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Magnetic fields in galaxies and galaxy clusters are believed to be the result of the amplification of seed fields during structure formation. However, the origin of this intergalactic magnetic field (IGMF) remains unknown. Observations of high-energy gamma rays from distant blazars offer an indirect probe of the IGMF. Gamma-rays interact with the extragalactic background light to produce electron-positron pairs, which can subsequently initiate electromagnetic cascades whose gamma-ray signature depends on the IGMF. Here, we report on a new search for the cascade emission using a combined data set from the Fermi Large Area Telescope (LAT) and the High Energy Stereoscopic System (H.E.S.S.). Using state-of-the-art Monte Carlo predictions for the cascade signal, our preliminary results exclude an IGMF $< 7e-16$ G for a coherence length of 1 Mpc even when blazar duty cycles as short as 10 years are assumed. This improves previous limits by a factor of 2.

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