

The quest for DM across the gamma-ray spectrum

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I will present recent advancements in the search for dark matter (DM) which span a wide energy spectrum from MeV to PeV.

For MeV DM, the INTEGRAL satellite has provided stringent constraints through gamma-ray observations, while X-ray data from the XMM-Newton observatory has offered critical insights into sub-GeV DM, further narrowing the parameter space.

At higher energies, the Fermi Large Area Telescope (Fermi-LAT) has been crucial in probing the GeV to TeV range, particularly focusing on the Galactic center excess, which whose nature is still a mystery. The upcoming Cherenkov Telescope Array (CTA) promises to enhance sensitivity for detecting TeV DM, representing a significant leap forward in our capabilities.

Finally, I will focus on the highest energies, where the Large High Altitude Air Shower Observatory (LHAASO) and the Tibet Air Shower Gamma (Tibet ASy) experiment extend the search for DM into the PeV regime. These efforts offer unique insights and constraints on ultra-high-energy DM particles, showcasing the potential of multi-wavelength and multi-messenger approaches in the ongoing quest to identify dark matter.

Presenter: CALORE, Francesca (University of Amsterdam)

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