Phenomenology 2025 Symposium



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Learning the energy dependence and source brightness distribution of the Galactic Center Excess

Tuesday 20 May 2025 14:30 (15 minutes)

An excess of gamma rays from the Galactic center is observed by the *Fermi* Space Telescope. The two leading hypotheses for the cause of this excess are millisecond pulsars or dark matter. Generically, we expect the statistics of these two sources to differ. We train a graph convolutional neural network (NN) to accurately determine the relative flux contribution of point sources to the Galactic center excess (GCE), training the model on the energy dependent data for the first time. The NN method allows us to avoid biases that have been attributed to existing likelihood based techniques and we show training on energy dependent data predicts sources that are indistinguishable from Poisson emission. We determine that we cannot rule out any of the flux of the GCE as Poisson-like and we need at least order O(100,000) point sources to explain the observed excess.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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Session Classification: Machine Learning

Track Classification: Machine Learning and Artificial Intelligence in Particle Physics