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Convolutional Neural Network Energy Reconstruction Method of Non-Fiducial Electrons Cosmic-Rays Using the DAMPE Experiment

The Dark Matter Particle Explorer (DAMPE) is a space-based cosmic-ray observatory with the aim, among others, to study cosmic-ray electrons (CREs) up to 10 TeV. Due to the low CRE rate at multi-TeV energies, we increase the acceptance by selecting events outside of the fiducial volume. Non-fiducial events, with their complex topology, require special treatment with sophisticated analysis tools. We propose therefore a Convolutional Neural Network to recover an accurate estimation of the initial energy of non-fiducial CREs. By leveraging deep learning, our method significantly improves the energy estimation over traditional algorithms, enabling a more precise measurement of high-energy CREs. We will demonstrate the CNN's effectiveness in mitigating shower leakage effects and discuss its potential for enhancing DAMPE's cosmic-ray observations.

Collaboration(s)

DAMPE

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