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AI for cosmic ray direct detection in space with the DAMPE mission

DArk Matter Particle Explorer (DAMPE) is a pioneering instrument launched in space in 2015, designed for precise cosmic ray measurements reaching unprecedented hundreds of TeV in energy. One of the key challenges with DAMPE lies in cosmic ray data analysis at such high energies. It has been shown recently that deep learning can boost the experiment precision in regression (particle reconstruction) and classification (particle identification) tasks, in some cases replacing conventional techniques such as Kalman-based track finding. The new deep learning pipeline of DAMPE allowed to extend the energy reach of its measurements and enabled a non-trivial enhancement in accuracy. In this talk, we will present the AI methods used in DAMPE emphasizing their impact for the science performed with the mission.

AI keywords

CNNs; offline data reconstruction; pattern recognition; regression; classification

Primary author: TYKHONOV, Andrii

Presenter: TYKHONOV, Andrii

Track Classification: Patterns & Anomalies