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Neural networks for TeV cosmic electrons identification on the DAMPE experiment

The past decades have witnessed the deployment of a new generation of cosmic ray (CR) observatories with unprecedented sensitivity and complexity, pushing towards ever-higher energies. To face the challenges of the multi-TeV domain, such instruments must be accompanied by equally powerful analysis techniques, able to exploit as much information as available. For example, the machine learning tool set may provide the needed techniques. We present a neural network optimised for the identification of multi-TeV electrons on DAMPE, a calorimetric spaceborne CR observatory with among other objectives the measurement of cosmic electrons up to 10 TeV. This constitutes a particularly challenging endeavour due to both the soft electron spectrum and the large proton background. The developed neural network significantly outperforms the more traditional cut-based approach, achieving a much lower proton contamination in the multi-TeV domain with a high signal efficiency, and retains its accuracy when transposed from Monte Carlo to real data.

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Collaboration / Activity

DAMPE Collaboration

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