Contribution ID: **19** Type: **not specified**

A deep learning method for the trajectory reconstruction of gamma rays with the DAMPE space mission

The Dark Matter Particle Explorer (DAMPE), a satellite-borne experiment capable of detecting gamma rays from few GeV to 10 TeV, studies the galactic and extragalactic gamma-ray sky and is at the forefront of the search for dark-matter spectral lines in the gamma-ray spectrum. In this contribution we detail the development of a convolutional neural network (CNN) model for the trajectory reconstruction of gamma rays. Four distinct models, each taking a different resolution Hough image of the DAMPE silicon-tungsten tracker converter (STK) as input, were trained with Monte-Carlo data. Their standalone and sequential-application performance was benchmarked, and a proof-of-concept with flight data was realized. The results indicate that the developed CNN is a viable approach for the gamma-ray track reconstruction. Further studies aimed at pushing the CNN performance beyond the conventional Kalman algorithm are ongoing.

Authors: Dr PERRINA, Chiara (EPFL - Ecole Polytechnique Federale Lausanne (CH)); FRIEDEN, Jennifer Maria (EPFL - Ecole Polytechnique Federale Lausanne (CH)); NUSSBAUM, Parzival

Presenter: FRIEDEN, Jennifer Maria (EPFL - Ecole Polytechnique Federale Lausanne (CH))