

A machine learning approach to track identification in emulsion cloud chambers

Authorship annotation

Session and Location

Monday Session, Poster Wall #113 (Auditorium Gallery Left)

Abstract content

Emulsion cloud chamber(ECC) was the key technology for the discovery of tau neutrino at the DONUT experiment and tau neutrino appearance via flavor oscillation at the OPERA experiment. Its micron-scaled event topology resolution and particle identification land ECC to a variety of applications with muonography, as well as the future SHiP experiment.

We present a track identification method for ECCs against random cosmogenic noise. In addition to position and direction, it exploits the local connectedness, clustering in both eculidean and hough-transformed spaces, and combines them iteratively with boost decision trees. The method is applied to a public simulated dataset on Kaggle platform from the MLHEP (Machine Learning in High Energy Physics Summer School). In the classification of electromagnetic shower and cosmogenic noise, we observed an improvement in area under receiver operating characteristic curve from 0.845 by chi-square statistic to 0.998 by our method.

Poster included in proceedings:

yes

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