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Invertable normalising flows for calorimeter simulation

The FTX-SFT group develops software tools and algorithms for HEP with aiming at experiments at future colliders, such as the planed FCCee or the ILC. One focus of the group is investigating the use of machine learning algorithms for fast detector simulation as well as reconstruction.

One of the rare features of normalising flows is that in principle they are invertible. That is, it is computationally tractable to run the transformation in either direction. In this project, a normalising flow architecture that has demonstrated success in the forward direction will be rewritten with tools that allow for inversion. This normalising flow is used to model the expected number of hits in each layer, given an incident energy and shower direction. If it could be inverted, then it would be able to calculate the likely hood of a given energy from a distribution of clusters. This method can be compared to traditional algorithms for estimating the incident particle energy. This project will compare reconstruction from an inverted normalising flow to traditional reconstruction methods.

Group

FTX-SFT

Project Category

B1. Physics data analysis and performance (software-oriented)

Special Qualifications

python

DESY Site

Hamburg

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