Paper – rough path

Abstract: to be done a last

Intro:
→ CALIFA: calorimeter for detection of gammas and light charged particles.
→ R3B broad program from coulex fission to p2p experiments, giant dipole resonances etc..
→ Especially for gammas the clusters are sparse
→ Double/single escape topic
→ Current Clustering algorithm: explain method
→ Plan: use the power of ML, graph neural networks (GNNs) for better/precise reconstruction

Methodology:
Data Preprocessing:
→ simulated data,uniformly distributed 0.3-10 MeV, true values available
→ maybe plot of the simulated detector…
→ time is simulated by myself→ explain how
→ in each event 3 gammas are simulated; multiple hits

Clustering:
→starting point is the standard clustering results, as benchmark
→next step, also more classic clustering: agglomerative model (scipy), with time info included
→ now real ML with NN: Edge model, explain architecture, etc
→ Motivation for agglo + edge: show good results of agglo, however still lot of fn
fn could be improved by using edge as complementary method
→ since those clustering methods use time→ try out r3b+ edge→ motivation: compare standard method with ML model. This could then be directly used

Results:
Show bar plots and shortly explain, loss curves
Show a gamma spectrum of the 2.1 MeV peak and compare spectra of different cluster methods

(Short) discussion:
This analysis should be seen as motivation also for other detector groups to use such kind of „simple“ models to improve signal reconstruction.
→ as outlook: deep set could be applied to decrease number of fp, transformer models could also be used, this could be of interest for more dim. Datasets