



Contribution ID: 30

Type: Hackathon project proposal

## Anomaly detection for new physics searches in HEP

*Friday, 4 October 2024 10:40 (20 minutes)*

Identify rare new physics process through an anomaly detection technique based on deep neural network (Graph Neural Network architecture).

Material for the exercise i.e. datasets and examples have been copied to the leonardo cluster and are available at:

`/leonardo/home/usertrain/a08trb55/anomalyDetection/LHCO`

### Project proposal: general context

High Energy Physics NP searches, Graph Neural Networks, Anomaly Detection

### Project proposal: description of the problem

Given a (pre-processed) dataset from fast simulation of a generic HEP detector containing a large number of events from Standard Model background processes and a test dataset containing both background and new physics signal events, design and train an anomaly detection model for anomaly detection of the NP processes.

### Machine learning methods

Graph Neural Networks and Auto-Encoder architectures

### Input dataset

Preprocessed data from LHC OLYMPIC benchmark dataset, provided as numpy arrays

### Goal and FOM

ROC curves, AUC

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**Session Classification:** Hackathon