Contribution ID: **459**   Type: **Talk**

Machine learning based event reconstruction for the MUonE experiment

Tuesday 22 October 2024 17:45 (18 minutes)

The evergrowing amounts of data produced by the high energy physics experiments create a need for fast and efficient track reconstruction algorithms. When storing all incoming information is not feasible, online algorithms need to provide reconstruction quality similar to their offline counterparts. To achieve it, novel techniques need to be introduced, utilizing acceleration offered by the highly parallel hardware platforms, like GPUs. Artificial Neural Networks are a natural candidate here, thanks to their good pattern recognition abilities, non-iterative execution, and easy implementation on hardware accelerators.

The MUonE experimenting, searching for the signs of New Physics in the sector of anomalous magnetic moment of a muon, is investigating the use of the machine learning techniques in data processing. Works related to the ML-based track reconstruction will be presented. The first attempt used deep multilayer perceptron network to predict parameters of the tracks in the detector. Neural network was used as the base of the algorithm that proved to be as accurate as the classical approach but substituting the tedious step of iterative CPU-based pattern recognition. Further works included implementation of the Graph Neural Network for classification of track segment candidates.

Primary author: ZDYBAL, Milosz (Polish Academy of Sciences (PL))

Co-authors: DRIUTTI, Anna (Universita & INFN Pisa (IT));   Mr MIZERA, Damian (Cracow University of Technology (PL)); HESS, Emma (Universita & INFN Pisa (IT)); KUCHARCZYK, Marcin (Polish Academy of Sciences (PL)); WOLTER, Marcin (Polish Academy of Sciences (PL)); GONCERZ, Mateusz Jacek (Polish Academy of Sciences (PL)); ASENOV, Patrick (Universita & INFN Pisa (IT))

Presenter: ZDYBAL, Milosz (Polish Academy of Sciences (PL))

Session Classification: Parallel (Track 2)

Track Classification: Track 2 - Online and real-time computing