EUROPEAN AI FOR
FUNDAMENTAL PHYSICS
CONFERENCE
EuCAIFCon 2024

Contribution ID: **157**   Type: **Talk without Poster**

Generic representations of jets at detector-level with self-supervised learning

Tuesday, 30 April 2024 17:22 (20 minutes)

Supervised learning has been used successfully for jet classification and to predict a range of jet properties, such as mass and energy. Each model learns to encode jet features, resulting in a representation that is tailored to its specific task. But could the common elements underlying such tasks be combined in a single foundation model to extract features generically? To address this question, we explore self-supervised learning (SSL), inspired by its applications in the domains of computer vision and natural language processing. Besides offering a simpler and more resource-effective route when learning multiple tasks, SSL can be trained on unlabeled data, e.g. large sets of collision data. We demonstrate that a jet representation obtained through SSL can be readily fine-tuned for downstream tasks of jet kinematics prediction and jet classification. Compared to existing studies in this direction, we use a realistic full-coverage calorimeter simulation, leading to results that more faithfully reflect the prospects at real collider experiments.

Primary authors: KOBYLIANSKII, Dmitrii (Weizmann Institute of Science);   GROSS, Eilam (Weizmann Institute of Science);   DREYER, Etienne (Weizmann Institute of Science);   MERZ, Garrett (University of Wisconsin);   CRANMER, Kyle (University of Wisconsin Madison);   SOYBELMAN, Nathalie (Weizmann Institute of Science);   KAKATI, Nilotpal (Weizmann Institute of Science);   RIECK, Patrick (New York University)

Presenter: RIECK, Patrick (New York University)

Session Classification: 3.4 Foundation models and related techniques