



EP-IT Data science seminars

SPEAKER: Jan Kieseler

TITLE: **Application and development of advanced deep neural networks for high-granularity calorimeters.**

DATE: 29 Jan 2020, 11:00

PLACE: 500/1-001 - Main Auditorium

ABSTRACT

High-granularity calorimeters, in particular those providing also fine-grained lateral resolution, offer unique possibilities to resolve the development of individual particle showers, separate electromagnetic and hadronic contributions on a shower-by-shower basis and perform calorimeter-driven identification tasks. Furthermore, they can be operated as tracking detectors makes it possible to follow the trajectories e.g. of muons passing through and connect individual parts of hadronic showers, provided the energy threshold is below MIP level. Analytic solutions based on simplified models and few tuneable parameters might not be able to harness the full potential in particular for hadronic showers. Machine learning techniques, however, have been very successful in pattern recognition tasks for images or - lately - point clouds, where algorithmic solutions tend to be overly complex and - at the same time - by far do not reach the same performance. The seminar will cover applications of neural network architectures to shower segmentation, particle identification and energy regression in high granularity calorimeters. The detector geometries and physics considerations call for customised solutions, therefore the focus will be on dedicated developments, such as special graph neural networks, and how they can be applied physics problems. This demand for new solutions triggers machine-learning developments beyond calorimeters with impact on other areas of reconstruction such as tracking and global event reconstruction, e.g. particle flow, but also beyond particle physics.

Organised by: M. Girone, M. Elsing, L. Moneta, M. Pierini.....

****Coffee will be served at 10h30****