Contribution ID : **256** Type : **Oral talk**

# Prediction of electromagnetic fraction in a hadronic shower using deep neural network

*Thursday, 1 December 2022 17:30 (15)*

The intrinsically large variation of the energy deposited in a calorimeter by hadrons imposes limitations on the improvement of hadron energy resolution. The fluctuation of electromagnetic fraction within a hadronic shower is known to be one of the main sources of such variations. Several techniques were developed to improve the energy resolution for hadrons including the so called hardware compensation (compensating and dual-readout calorimeters) and software compensation approaches. The reliable prediction of the amount of electromagnetic fraction on an event-by-event basis opens a possibility to correct the energy during the offline reconstruction and improve the energy resolution. In this study, the samples were investigated of hadronic showers simulated with physics lists from Geant4 package version 10.3 in the model of a highly granular hadron calorimeter for the initial hadron energies 10–80 GeV. The deep neural network was trained using a supervised learning and calorimetric observables as inputs to predict the electromagnetic fraction in a shower. The achieved neural network performance and observed improvement in hadron energy resolution of more than 15% are presented and discussed.

**Primary author(s) :** Dr. CHADEEVA, Marina (P.N. Lebedev Physical Institute of RAS (LPI)); KORPACHEV, Sergey (LPI); Mrs. STARITSYNA, Anna (MIPT)

**Presenter(s) :** Dr. CHADEEVA, Marina (P.N. Lebedev Physical Institute of RAS (LPI))

**Session Classification :** Facilities and Advanced Detector Technologies

**Track Classification :** Facilities and advanced detector technologies