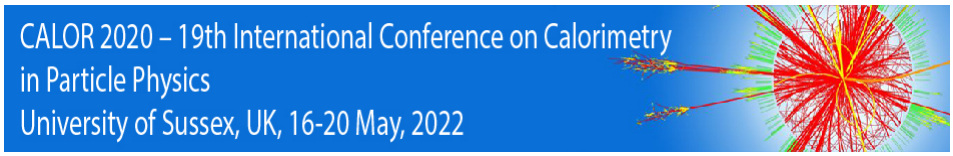

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A novel approach to understanding hadronic showers using machine learning technique

The development and improvement of different models implemented in the simulation of particle interactions with matter rely on comparisons of theoretical predictions with test beam data. The highly granular calorimeters provide a set of calorimetric observables, in particular topological, which can help in our understanding of the source of discrepancies between data and simulations. In this work, we show the relationships between calorimetric observables and properties of secondaries generated by Geant4 during the propagation of hadronic shower initiated by a single pion through the model of the highly granular CALICE analogue hadron calorimeter. A deep neural network with several calorimetric observables as input features is trained using a supervised learning to predict the properties of secondary particles in a shower. The achieved performance of the regression model is demonstrated. The perspectives of implementation of the proposed approach for validation of hadronic shower simulations at secondaries level is also discussed.

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