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Comparison of Geant4 simulation data with hadron shower data in the PAMELA experiment

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The PAMELA electromagnetic calorimeter consists of 44 single-sided silicon sensor planes interleaved with 22 plates of tungsten absorber. It provides a comprehensive information about spatial development of hadronic showers, and about deposited energy amount.

In this work, Monte Carlo simulations (based on Geant4) performed using different available models, including Fritiof (FTF) and Quark Gluon String (QGS) models of high energy hadron–nucleus interactions with Li\~ege (INCL) and Bertini (BERT) intranuclear cascade models. We compared various hadronic shower parameters of simulated data with the data obtained during PAMELA experiment. These parameters describe energy release in the calorimeter, longitudal profile, position of the shower maximum etc. As a representative parameter, we use correlation curves, or size-rate curves, which are describing a dependence of the cascade size on the rate of development of the cascade process.

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