

Reconstruction and study of hadronic showers with highly granular calorimeters

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Prototype imaging electromagnetic and hadronic calorimeters developed and operated by the CALICE collaboration provide an unprecedented wealth of highly granular data of hadronic showers for a variety of active sensor elements and different absorber materials. In this presentation, we discuss the reconstruction and energy resolution of single hadrons in individual detectors and combined electromagnetic and hadronic systems using software compensation and semi-digital energy reconstruction. We report on the performance of particle flow algorithms, both in terms of improved energy resolution with software compensation techniques for simulated particle jets and for the separation of nearby particles. A prototype scintillator-based hadron calorimeter provides time information at the few nanosecond level, extending previous studies of the time structure of hadronic showers in steel and tungsten absorbers to larger detector volumes. These measurements, together with studies of the spatial structure of hadronic showers with different active elements, provide four-dimensional information for hadronic showers which are confronted with GEANT4 simulations using different hadronic physics models.

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