

Energy Reconstruction of Hadrons in highly granular combined ECAL and HCAL systems

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The CALICE collaboration develops highly granular calorimeters for present and future collider experiments. Among the physics prototypes already tested extensively in particle beams are Silicon-Tungsten (SiW ECAL) and Scintillator-Tungsten (Sc ECAL) electromagnetic calorimeters and a scintillator-SiPM based analog hadron calorimeter (AHCAL). These prototypes were operated together in hadron beams, permitting the study of the performance in combined ECAL / HCAL systems.

This contribution will discuss the energy reconstruction and calibration for the SiW ECAL + AHCAL and Sc ECAL + AHCAL configuration, which has to account for the differing geometry and, in the first case, for the different readout technology in the sub-systems. Two techniques for the energy reconstruction are used, a standard reconstruction based on calibrated sub-detector energy sums, and one based on a software compensation algorithm making use of the local energy density information provided by the high granularity. The software compensation-based algorithm improves the hadronic energy resolution by up to 30% compared to the standard reconstruction. The energy resolution in the combined system is comparable to the one achieved for showers starting only in the AHCAL, demonstrating the success of the inter-calibration of the different subsystems.

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