

CALOR14

The CALICE Digital Hadron Calorimeter: Calibration and Response to Pions and Positrons

The paradigm of Particle Flow Algorithms (PFAs) is proposed to achieve jet energy resolutions of 3 – 5 % at a future lepton collider. PFAs attempt to measure each particle in a hadronic jet individually, using the component providing the best energy/momentum resolution. In this approach, charged particles are measured with a high-precision tracker, photons with the electromagnetic calorimeter and the remaining neutral hadronic particles in a jet with the combined electromagnetic and hadronic calorimeters.

In this context, the CALICE collaboration developed a Digital Hadron Calorimeter (DHCAL). A large-scale prototype DHCAL was built in 2009 – 2010 and was subsequently tested in the Fermilab test beam.

The DHCAL uses Resistive Plate Chambers (RPCs) as active media and is read out with 1 x 1 cm² pads and digital (or 1 - bit) resolution. With a world record of about 480k readout channels, the DHCAL offers the possibility to study hadronic interactions with unprecedented spatial resolution. Here we report on the results from the analysis of secondary beam events of momenta between 2 to 60 GeV/c collected in the Fermilab test beam. We present the details of the intricate calibration procedures and the calorimetric response to single particles.

TIPP14

The CALICE Digital Hadron Calorimeter: Calibration and Response to Pions and Positrons

The large CALICE Digital Hadron Calorimeter prototype (DHCAL) was built in 2009 - 2010 and was tested in the Fermilab and CERN test beams. The DHCAL uses Resistive Plate Chambers (RPCs) as active media and is read out with 1 x 1 cm² pads and digital (or 1 - bit) resolution. With a world record of nearly 480k readout channels, the DHCAL offers the possibility to study hadronic interactions with unprecedented spatial resolution. Here we report on the results from the analysis of pion and positron events of momenta between 2 to 60 GeV/c collected in the Fermilab test beam. Particular emphasis is given to the intricate calibration procedure. The analysis demonstrates the unique utilization of detailed event topologies.