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Technological Prototypes and Result Highlights of Highly Granular Calorimeters

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Following successful demonstrations of the potential of highly granular calorimeters by the CALICE collaboration, the emphasis of current R&D has shifted to the next generation of prototypes. Optimized for Particle Flow Algorithms (PFA) which will achieve unprecedented jet energy resolution at future colliders, this new generation of CALICE calorimeters also addresses full system requirements such as compactness and low power consumption. These activities cover further developments of the technological prototype of the RPC-based SDHCAL already tested in beams, the construction of a full technological prototype of the SiPM / scintillator - based Analog HCAL following recent tests of smaller systems, and a second-generation SiW ECAL. Within these projects, large detector areas, automatic assembly and testing procedures and self-supporting mechanical structures are being developed. The detectors use a new generation of low noise, power-pulsed electronics with independent channels and zero suppression protocol as well as precise cell-by-cell time stamping. The prototypes will be instrumented with a common DAQ system to enable combined beam tests of several prototypes and have already successfully been operated with a newly developed monitoring and control system. This presentation will discuss the latest technological developments of these new calorimeter prototypes, and highlight areas of fruitful synergies with planned and ongoing upgrades of LHC experiments.

Experimental Collaboration

CALICE

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