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Simlation and test beam results of a capillary tube, dual-reaout calorimeter

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The precision measurements planned at future lepton colliders require excellent energy resolution especially in multi-jet events to successfully separate Z, W, and Higgs decays. Especially in hadronic decays, the resolution is largely limited by event-to-event fluctuations in the shower development. By compensating for these fluctuations, it is possible to improve the energy resolution drastically. Furthermore, the new approach of Particle Flow, which requires a highly granular calorimeter, aims to improve the overall detector performance including energy resolution.
Over the past years the dual-readout method, which exploits complementary information from Scintillation and Cherenkov channels, has emerged as candidate to fulfil these requirements. While the dual-readout approach has been tested experimentally quite extensively, this type of calorimeter has never been used in a collider setting. In recent years dedicated studies in simulation as well as test beam prototypes have investigated various detector geometries based on a fibre dual-readout calorimeter. One variation of the geometry, relying on capillary tubes, promises easy assembly with excellent geometrical accuracy at a moderate cost. In this talk we present the latest results from simulation of this newest prototype as well as compare this to recent test beam results. The simulation is also used to investigate the performance with a larger prototype fit for hadronic shower containment and the full "4π" detector geometry using the capillary tube design.

Collaboration

Role of Submitter

I am the presenter

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