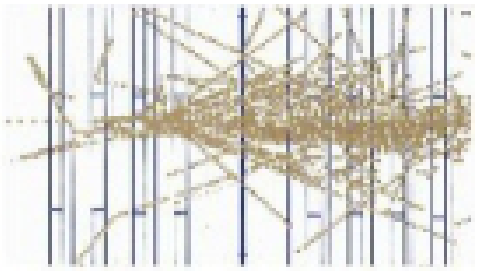

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Dual-Readout Calorimetry with Crystals

Summary

The energy resolution of a calorimeter is determined by fluctuations. In almost all calorimeters the electromagnetic shower fraction fluctuation dominate the energy resolution for hadrons and jets. The DREAM sampling calorimeter was built to eliminate this source of fluctuations by allowing a determination, on an event-by-event basis, of the electromagnetic shower fraction. This is achieved by sampling the energy deposited in the calorimeter with two different active media, scintillating and quartz fibers, which measure respectively the scintillating and the Cherenkov light produced by the shower. The energy resolution of the DREAM calorimeter is however not only limited by the sampling fluctuations but also by the small Cherenkov light yield (8 photoelectrons per GeV) which contributes more than 35%/sqrt(E) to the measured hadronic energy resolution. In order to improve this we investigated the possibility of using the dual-readout approach in homogeneous calorimeters. This can be done provided that a way is found to distinguish the Cherenkov and the scintillating light produced by the shower in the homogeneous medium. In this presentation a report on the studies performed with lead-tungstate and BGO crystals will be given.

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