

Development of Structured Scintillator Tiles for High-Granularity Calorimeters

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In order to improve the jet energy resolution and particle identification of future high-energy physics experiments, the calorimeters of the detector systems need a fine 3-D segmentation. Depending on the size and technology, millions of individual channels consisting of a photosensor coupled to a scintillator tile have to be assembled. The usage of structured plastic scintillators with optically separated segments simplifies the mass production. We present the design, production, and performance of a 36cm x 36cm scintillator tile divided into 144 segments matching the geometry of the SiPM-based calorimeter frontend developed by the CALICE collaboration. This approach features a full integration of scintillators, sensors, and electronics. For several prototypes the light yield of the channels and an upper limit for the optical crosstalk have been measured in a cosmic-ray test stand. Conclusions from the development process on the optimum design and production technique are drawn.

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