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Longitudinally segmented shashlik calorimeter with SiPM readout

Shashlik calorimeters are particular types of sampling calorimeters where the stack of alternating slices of absorber and scintillating material is crossed by wavelength shifting fibers (WLS) perpendicularly to the absorber and scintillator tiles. Characterized by low cost and good performances, shashlik calorimeters are usually not suited for longitudinal segmentation since the fibers are often grouped and coupled to photomultipliers at the back of the stack. This contribution presents the test of a compact shashlik calorimeter readout by Silicon PhotoMultipliers (SiPMs) where longitudinal segmentation has been achieved alternating WLS fibers of different lengths. The calorimeter is composed of 40 8x8 cm^2, 3.3 mm thick tiles (20/20 lead/plastic scintillator), for a total of 11 X_0; 64 0.8 mm WLS fibers are used for the light readout: half of the fibers cross the whole calorimeter, while the other half cross only the last 5.5 X_0. The SiPM readout has been implemented by means of a custom electronic board directly embedded on the last calorimeter tile: each WLS fiber is readout by a 1.2 mm diameter circular SiPM with 673, 40x40 μm^2 area cells. The embedded readout allows to stack more shashlik modules one after the other, minimizing the dead zones and also improving the longitudinal segmentation. The performances of the calorimeter in terms of energy resolution and e-/pion separation have been evaluated on the CERN PS-T9 beamline in the 1-5 GeV energy range.

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