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Test beam performance of a digital pixel calorimeter

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A prototype of a digital pixel EM calorimeter, EPICAL-2, has been designed and constructed, following up on a previous prototype [1]. It consists of alternating W absorber and Si sensor layers, with a total thickness of ~ 20 radiation lengths, an area of $30\text{mm} \times 30\text{mm}$, and ~ 25 million pixels. The new EPICAL-2 detector employs the ALPIDE pixel sensors developed for the ALICE ITS upgrade. This R&D is performed in the context of the proposed Forward Calorimeter upgrade for the ALICE experiment, but it also serves the general understanding of the principle of a fully digital calorimeter.

We will report on first results regarding alignment and calibration from cosmics and on the calorimeter performance measured with the DESY electron beam. The prototype shows good energy resolution and linearity, comparable with those of a SiW calorimeter with analog readout. We will also show first results of shower-shape studies with unprecedented spatial precision.

[1] JINST13 (2018) P01014.

Time Zone

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