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An extreme granularity electromagnetic calorimeter using monolithic pixels for future forward measurements in ALICE

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A forward electromagnetic calorimeter (FoCal), to be placed in the pseudorapidity range of $2.5 < \eta < 4.5$, is being discussed as one of the upgrade plans for the LHC-ALICE experiment. One of the motivations for building such a detector is the study of direct photons, as well as correlations including photons, pions and jets in pp,pA and AA collisions at the highest LHC energies. Such measurements will require a detector of extremely high granularity, capable of discriminating photons from neutral pions at high energies. This detector will also have unique capabilities to resolve overlapping showers in a very high-multiplicity environment.

A prototype of a sub-100 μm pixel detector based on a silicon-tungsten layered structure was built in 2011. The active regions of the prototype consist of MIMOSA chips, having a thin active detecting element, and an undepleted silicon layer with readout electronics directly on top of it. Detector beam-tests have been conducted at CERN-PS and DESY to evaluate its feasibility and performance. We present an evaluation of the prototype performance, along with the first beam-test results, as well as further MIMOSA prototype developments.

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