

Noise performance of the ALPIDE-based ALICE Inner Tracking System

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The new ALICE Inner Tracking System is the first large-scale MAPS-based tracking system. It is covering an active surface of 10 m², with a total of 12.5 billion pixels. Several optimisations of the pixel chip lead to a quasi noise-free operation, with measured fake-hit rates of below 1 hit per pixel and billion events (on system level), numbers compatible with the order of magnitude expected from cosmic and natural background radiation. This contribution covers a detailed study of fake hits as recorded in the innermost detector barrels, made of the highest quality chips. It reveals a localised noise pattern that could be traced down to originate from decoupling capacitors present on the detector module. It can most-likely be explained by the radiative decay of Pb-210, which is present in trace amounts in the lead-based solder that was used to mount these capacitors on the detector modules. This hypothesis is substantiated with a dedicated simulation study and laboratory measurements.

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