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The ALICE ITS upgrade

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The ALICE experiment at CERN is built to study the properties of the strongly interacting matter created in heavy-ion collisions at the LHC. A major upgrade of its Inner Tracking System (ITS) is currently undergoing, which will increase the data taking capability by more than two orders of magnitude. At the same time, the secondary vertexes reconstruction precision will improve by at least a factor 3.

The enabling technology for such performance boost is the adoption of custom-designed Monolithic Active Pixel Sensors (MAPS) to instrument the 10 square meters ITS sensible surface. Manufactured in the Tower-Jazz 180 nm CMOS imaging sensor process on wafers with a high resistivity epitaxial layer, the ALice PIxel DEtectors (ALPIDE) embed several design innovations to optimize charge collection efficiency, sustainable hit rate and low power consumption. The connections topology developed to read, control and supply the about 25000 sensors composing the ITS, and the technical solutions adopted to mechanically support them, also contribute to reach the target performance level.

In this talk we will go through the most innovative elements which characterize the ITS design, illustrating the driving physics targets and discussing the adopted solutions, together with the major problems faced to implement them. Expected final system performance and actual sensors characterization figures will provide compelling evidence of the advantages monolithic technology can bring to HEP tracking apparatus.

Experimental Collaboration

ALICE

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