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Development of CMOS Pixel Sensors for the Upgrade of the ALICE Inner Tracking System

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The ALICE Collaboration is preparing a major upgrade of the current detector, planned for installation during the second long LHC shutdown in the years 2018-19, in order to enhance its low-momentum vertexing and tracking capability, and exploit the planned increase of the LHC luminosity with Pb beams.

One of the cornerstone of the ALICE upgrade strategy is to replace the current Inner Tracking System in its entirety with a new, high resolution, low-material ITS detector. The new ITS will consist of seven concentric layers equipped with Monolithic Active Pixel Sensors (MAPS) implemented using the 0.18 μm CMOS technology of TowerJazz. In this contribution, the main key features of the ITS upgrade will be illustrated with emphasis on the functionalities of the pixel chip. The ongoing developments on the readout architectures, which have been implemented in several fabricated prototypes, will be discussed. The operational features of these prototypes as well as the results of the characterization tests before and after irradiation will also be presented.

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