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The LS3 upgrade of the ALICE Inner Tracking System based on ultra-thin, wafer-scale, bent Monolithic Active Pixel Sensors

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During LHC LS3, ALICE plans to replace its innermost tracking layers with a new detector that is based on wafer-scale Monolithic Active Pixel Sensors, fabricated in 65 nm on 300 mm wafers. These sensors will be thinned down to 20-40 μm, a thickness such that they become flexible enough to be shaped into half cylinders. This will allow to place them very close to the beam pipe, at a distance of only 18 mm away from the interaction point. In addition, no supporting material –neither for powering, nor for cooling and data transmission –will be necessary due to a fully monolithic integration of the full stave-length into a single chip. The resulting arrangement features an unprecedented material-budget value of below 0.05% X0 per layer and will directly and substantially enhance the physics programme of ALICE.

This contribution will review the detector concept, the physics motivations, and lays out the R&D path. The R&D phase of the project has recently been endorsed by the Large Hadron Collider Committee, and was launched in December 2019.

Primary author: MAGER, Magnus (CERN)

Presenter: MAGER, Magnus (CERN)

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