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# Novel silicon detectors in ALICE at the LHC: the ITS3 and ALICE 3 upgrades

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The ALICE experiment is preparing for the ITS3 upgrade, which is set to take place during the LHC Long Shutdown 3. The aim of this upgrade is to replace the three innermost tracking layers with truly cylindrical wafer-scale Monolithic Active Pixel Sensors (MAPS). By adopting this innovative technology, ALICE will further reduce the material budget and the distance from the interaction point, thus significantly improving its tracking and vertexing capabilities. The R&D program for ITS3 includes several advancements, such as operability of bent MAPS, validation of the 65nm CMOS technology and employment of the stitching process to produce wafer-scale sensors.

In addition to the ITS3 upgrade, ALICE is designing a completely new apparatus, ALICE 3, planned for LHC Run 5 and 6. The detector consists of a large MAPS-based tracking system covering eight units of pseudorapidity, complemented by multiple systems for particle identification, including silicon time-of-flight layers, a ring-imaging Cherenkov detector, a muon identification system, and an electromagnetic calorimeter. The vertex detector will be based on an evolution of the ITS3 concept aiming at a track pointing resolution of better than 10 micron for $p_{\mathrm{T}}$>200 MeV/c through the integration of the tracking layers in a retractable structure inside the beam pipe. ALICE 3 will, on the one hand, enable novel studies of the quark-gluon plasma and, on the other hand, open up important physics opportunities in other areas of QCD and beyond.

The presentation will cover both the ITS3 upgrade and the plans for ALICE 3, highlighting the detector concept, the physics performance, and the status of novel sensor R&D. It will showcase the achievements already made and provide an outline of the future plans for advancing the detector technologies.

## Category

Experiment

## Collaboration (if applicable)

ALICE

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