

# Study of MAPS silicon detector prototypes for the ALICE Inner Tracking System upgrade

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The ALICE experiment of the Large Hadron Collider (LHC) at CERN has planned an upgrade of the Inner Tracking System (ITS), called ITS3, for the LHC Long Shutdown 3, in 2025. The cornerstone of the upgrade is a new CMOS-65 nm pixel chip, built using Monolithic Active Pixel Sensor (MAPS) technology using the stitching technology to extend the chip length to 26 cm and bent around the beam pipe, replacing the three innermost layers of the existing detector with new ultra-light, truly cylindrical layers. ITS3 will show much higher tracking performances, especially at low transverse momentum, thanks to the better track impact-parameter resolution, improved by a factor two with respect to the current ITS2. In addition, the detector will be closer to the interaction point and will have a much lower material budget, of 0.02-0.04%  $X_0$ . The final configuration and structure of the ITS3 will be presented, as well as the challenges related to its design and construction and the results of the current R&D program on the sensor design and characterization. Finally, results of data collected at beam tests at CERN testing an analog pixel test chip (APTS Source Follower) will be reported. The performance in terms of their total efficiency and spatial resolution in different configurations will be presented and discussed.

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