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Design and expected performance of ALICE ITS3 tracker upgrade

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During LHC LS3 (2026-29) ALICE is replacing its innermost three tracking layers by a new detector, “ITS3”. It will be based on newly developed wafer-scale monolithic active pixel sensors, which are bent into truly cylindrical layers and held in place by light mechanics made from carbon foam. Unprecedented low values of material budget (0.07% per layer) and closeness to interaction point (19 mm) lead to a factor two improvement in pointing resolutions from very low p_T ($O(100 \text{ MeV}/c)$), achieving, for example, $20 \mu\text{m}$ and $15 \mu\text{m}$ in the transversal and longitudinal directions, respectively, for $1 \text{ GeV}/c$ particles. After a successful R&D phase 2019-2023, which demonstrated the feasibility of this innovational detector and led to the Technical Design Report (<https://cds.cern.ch/record/2890181>), the final sensor and mechanics are being developed right now. This contribution will review the conceptual design and the main R&D achievements, as well as the current activities and road to completion and installation. It concludes with a projection of the improved physics performance, in particular for heavy-flavour mesons and baryons, as well as for thermal dielectrons, that will come into reach with this new detector installed.

Secondary track

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