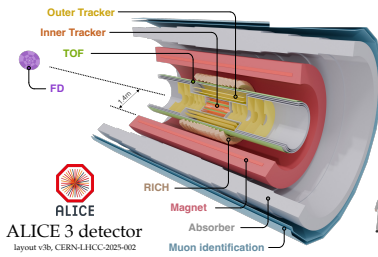


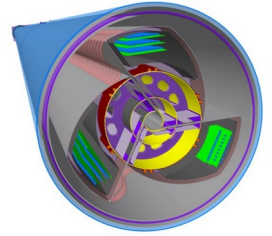
Alessandro Sturniolo (University of Liverpool), on behalf of the ALICE Collaboration

14th International Conference on Position Sensitive Detectors (London, 1-4 September 2026)



- ALICE 3: a new detector, with unprecedented pointing resolution and extensive PID capabilities over a large acceptance;
- **11 tracking detector barrel layers and 12 discs:**
 - **Inner Tracker (IT):** Vertex Detector (VD, layers 0 to 2) + Middle Layers (ML, layers 3 to 7);
 - **Outer Tracker (OT):** layers 8 to 10 + 12 discs.
- VD layers will be positioned **inside the beam pipe**, featuring a **retractable geometry**.

See also Kshitij Agarwal's talk if you are interested in the ALICE 3 Inner Tracker!

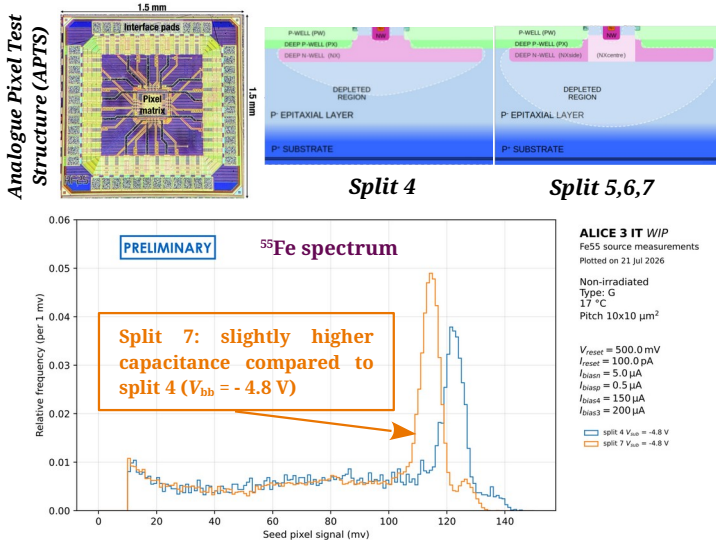


VD geometry

ALICE 3 Tracker: performance goals

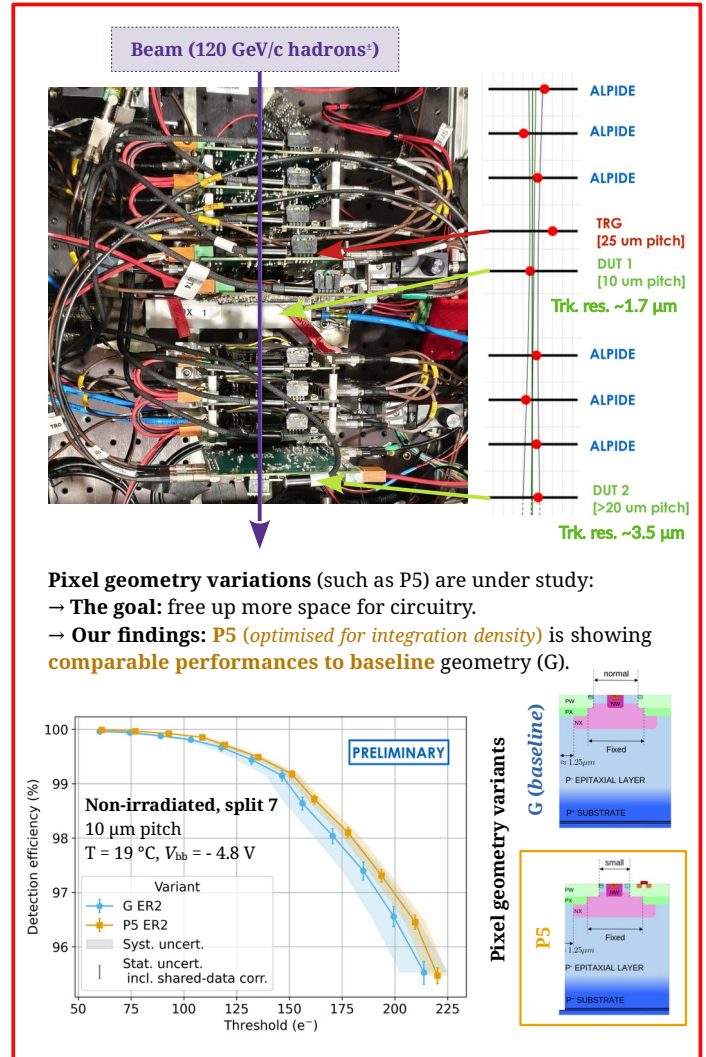
- **Material budget/layer:** 0.1% X_0 (VD), 1% X_0 (ML/OT);
 - **Spatial resolution:** $\sim 2.5 \mu\text{m}$ (VD), $\sim 10 \mu\text{m}$ (ML/OT);
 - **Power cons.:** $\sim 70 \text{ mW/cm}^2$ (VD), $\sim 20\text{-}30 \text{ mW/cm}^2$ (ML/OT);
 - **High avg. hit rates**, up to $\sim 100 \text{ Mhz/cm}^2$ (pp collisions*);
 - **Time resolution:** $\sim 100 \text{ ns}$;
- *Values for a layer radius $r = 5 \text{ mm}$.

- Pixel sensors for ALICE 3 IT and OT developed by the common ALMIRA (ALICE 3 Monolithic Integrated tRacker ASICs) project.
- Different sensor implementations (splits) under study (variations of doping levels, profiles):
 - Split 4: current baseline;
 - Splits 4, 5, 6: lower capacitance, optimised for back-bias voltage $V_{bb} = -1.2 \text{ V}$ (targeting ML/OT);
 - Split 7: faster charge collection (targeting VD), but slightly increased capacitance, optimised for back-bias of at least -4.0 V .



Conclusions

- New APTS splits developed to face needs of ALICE 3 IT/OT;
- **P5 pixel variant** shows comparable performances to baseline (G): a **major milestone towards $10 \mu\text{m}$ pixel pitch!**
- **Work in progress:** lab data taking and test beam data analysis is still ongoing.



ALICE Collaboration. "Letter of intent for ALICE 3: A next generation heavy-ion experiment at the LHC", CERN-LHC-2022-009, arXiv: 2211.02491;

ALICE Collaboration. "Scoping document for the ALICE 3 detector", CERN-LHCC-2025-002;

E. Dall'Occo, on behalf of the ALICE Collaboration. "Characterisation of pixel chip prototypes for ALICE 3", talk presented at 34th International Workshop on Vertex Detectors (VERTEX2026), 20-24 Jul 2026 (<https://indico.cern.ch/event/1618157/contributions/7100372/>);

A. S. Triolo, on behalf of the ALICE Collaboration. "Developments towards the ALICE 3 Inner Tracker", talk presented at: 34th International Workshop on Vertex Detectors (VERTEX2026), 20-24 Jul 2026 (<https://indico.cern.ch/event/1618157/contributions/7100348/>).