

Towards the construction of the ATLAS ITk Strip Endcap detector for the HL-LHC phase.

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Why a new tracking detector for ATLAS?

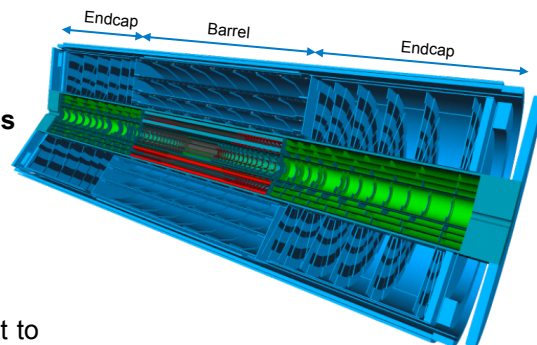
The High-Luminosity LHC (HL-LHC) phase will pose challenging conditions

Instantaneous luminosity up to $7.5 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ [1] leads to

- ~ 200 inelastic interactions/bunch crossing (pile-up)
- increased data rates
- increased radiation levels

We are building a new all-silicon tracking detector, the Inner Tracker (ITk)

- higher granularity, radiation hardness, readout speed and low material budget to maintain and exceed the current tracking system performance



The ITk detector.

In green the pixel detector, in blue the strip detector

Recipe to assemble an ITk Strip Endcap from tested modules

Ingredients

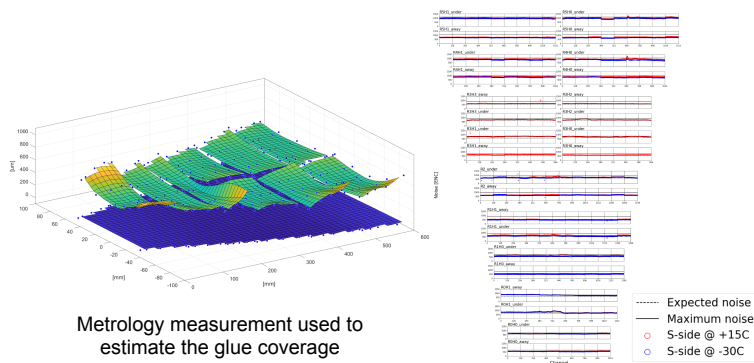
- 2304 modules (strip sensor, hybrids and powerboard), in 6 flavours, after QC (metrology and electrical) testing
- 192 petal cores, after QC (metrology, thermal, electrical) testing
- One Endcap structure, with readout, power and cooling services

1. Module loading

- (A) Gluing: the gantry head (1) holds the syringe (2) filled with glue and dispenses the glue on top of the petal (3)
- (B) Loading: the gantry uses the pick-up tools (4) to transfer the modules from the module jig (5) to the petal, aligning the module within 50 μm from its ideal position

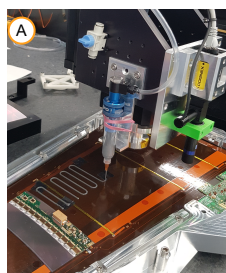
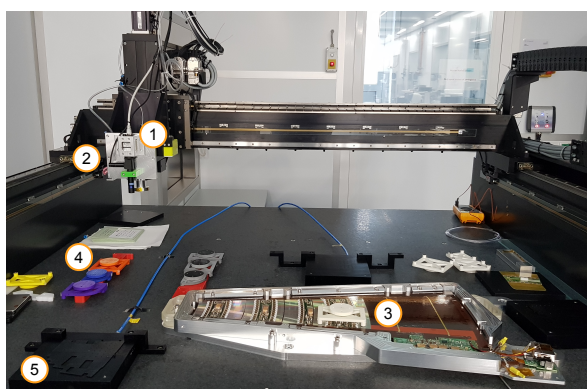
2. Loaded petal QC

- Metrology and electrical measurements

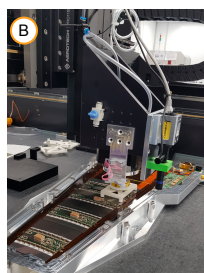


3. Integration

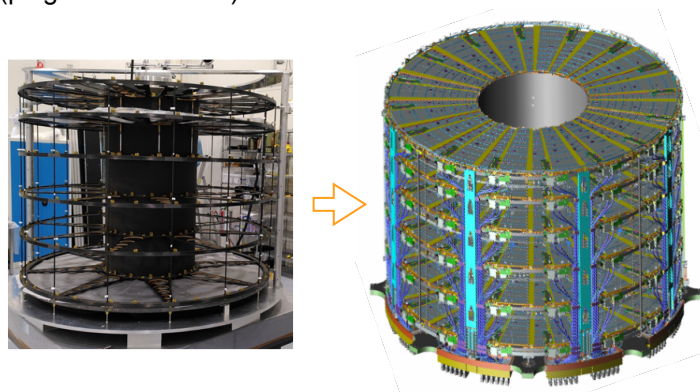
- Requires large tools (Superframe, insertion tower and hands, tower and access platforms)
- Insert each petal in the Endcap structure
- Each petal and each segment (16 petals) extensively tested (ping and cold tests)



Serpentine pattern of the glue



Loading the module



References.

[1] <https://doi.org/10.1016/j.nima.2022.167597>

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