

An instrument for discovery at the High-Luminosity LHC.

The ATLAS Inner Tracker.

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With the discovery of the Higgs boson, the Standard Model of particle physics has reached completion; however, it still fails to address several fundamental questions. The particle physics community is therefore searching for small deviations from Standard Model predictions or rare phenomena that could guide us toward new physics. Achieving this goal requires next-generation colliders that push the boundaries of both energy and/or statistical precision.

The Large Hadron Collider (LHC) is entering a new era with its upgrade to the High-Luminosity LHC (HL-LHC). To meet the demands of this enhanced accelerator, the experiments must also undergo significant upgrades. In the ATLAS experiment, the innermost detector will be replaced by the new Inner Tracker (ITk)—a fully silicon-based system designed to extend tracking coverage and improve spatial and timing resolution. Operating in an extremely harsh radiation environment.

This talk will present key highlights and lessons learned throughout the R&D and production phases of the ITk—set to become the most advanced tracking detector ever built.