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Expected reconstruction performance with the new ATLAS Inner Tracker at the High-Luminosity LHC

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The High Luminosity-Large Hadron Collider is expected to start in 2027 and to provide an integrated luminosity of 3000 fb⁻¹ in ten year, about a factor 20 more than what was collected so far. This high statistics will allow to perform precise measurements in the Higgs sector and improve searches of new physics at the TeV scale.

The luminosity needed is $L \sim 7.5 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, correspondent to ~200 additional proton-proton pile-up interactions, which can significantly degrade the reconstruction performances.

To face such harsh environment some sub-detectors of the ATLAS experiment will be upgraded or completely substituted.

The current Inner Detector will be replaced with a new all-silicon Inner Tracker (ITk) designed to face the challenging environment associated with the high number of collisions per bunch crossing. In this poster an overview of the ITk performance to reconstruct and identify high-level objects will be shown.

A particular focus will be given to the pile-up jets tagging and the impact of the spatial density of the number of collisions per bunch crossing.

Collaboration

ATLAS

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