

Improvements to ATLAS Inner Detector Track reconstruction for LHC Run-3

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Reconstruction of charged particle trajectories (tracks) in the tracking detector surrounding the interaction region is a key component of the event reconstruction in the ATLAS experiment at the Large Hadron Collider. The ATLAS Inner Detector (ID) records up to 1500 individual signals (hits) per proton-proton collision, and between 20 and 60 collisions happen simultaneously at each bunch crossing.

As a result, about 30000 to 90000 individual hits need to be combined into track candidates.

This represents a significant combinatorial challenge, and track reconstruction was by far the largest single user of processing time in the reconstruction of the LHC Run 2 data.

In preparation for LHC Run 3, the ATLAS collaboration undertook a major effort to optimize and speed up the track reconstruction for the coming data-taking campaign.

This talk will summarize track reconstruction strategy in ATLAS, outline the improvements that were made and show their impact on the computational and physics performance.

If time permits, an outlook to track reconstruction with the new ITk tracking detector to be installed for the High-Luminosity LHC campaign can be given.

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