

Connecting The Dots 2023



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Clustering and tracking in dense environments with the ITk

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Dense hadronic environments encountered, for example, in the core of high-transverse-momentum jets, present specific challenges for the reconstruction of charged-particle trajectories (tracks) in the ATLAS tracking detectors, as they are characterised by a high density of ionising particles. The charge clusters left by these particles in the silicon sensors are more likely to merge with increasing particle densities, especially in the innermost layers of the ATLAS silicon-pixel detectors. This has detrimental effects on both the track reconstruction efficiency and the precision with which the track parameters can be measured. The new Inner Tracker (ITk), which will replace the ID for the High-Luminosity LHC programme, features an improved granularity due to its smaller pixel sensor size, which is expected to reduce cluster merging rates in dense environments. In this contribution, the cluster and track reconstruction performance in dense environments is studied with the most 23-00-03 ITk layout. Different quantities are studied to assess the effects of cluster merging at the cluster-, track-, and jet-level.

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