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Improved track reconstruction for prompt and long-lived particles in ATLAS for the LHC Run 3

In preparation for LHC Run 3, ATLAS completed a major effort to improve the track reconstruction performance for prompt and long-lived particles. Resource consumption was halved while expanding the charged-particle reconstruction capacity. Large-radius track (LRT) reconstruction, targeting long-lived particles (LLP), was optimized to run in all events expanding the potential phase-space of LLP searches. The detector alignment precision was improved to avoid limiting factors for precision measurements of Standard Model processes. Mixture density networks and simulating radiation damage effects improved the position estimate of charged particles overlapping in the ATLAS pixel detector, bolstering downstream algorithms' performance. The ACTS package was integrated into the ATLAS software suite and is responsible for primary vertex reconstruction. The talk will highlight the above achievements and report on the readiness of the ATLAS detector for Run 3 collisions.

Submitted on behalf of a Collaboration?

Yes

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