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Current and expected performance of tracking and vertexing with the ATLAS detector at the LHC and the HL-LHC

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The ATLAS detector at the Large Hadron Collider (LHC) has had an extremely successful data collecting period during 2017, recording over 45 fb-1 of proton-proton collision data at sqrt(s) = 13 TeV. This was achieved, in part, by running the LHC at a high instantaneous luminosity level of over 1.5 x 10+34 cm-2s-1, which corresponds to over 57 inelastic proton-proton collisions per beam crossing. This talk will highlight the tracking and vertexing performance of the tracking detector within ATLAS (Inner Detector) throughout this successful year of data taking.
In order to increase its potential for discoveries, the High Luminosity Large Hadron Collider (HL-LHC) aims to increase the LHC data-set by an order of magnitude by collecting 3,000 fb-1 of recorded data. Starting, from mid-2026, the HL-LHC is expected to reach the peak instantaneous luminosity of 7.5 x 10+34 cm-2s-1, which corresponds to about 200 inelastic proton-proton collisions per beam crossing. To cope with the large radiation doses and high pileup, the current ATLAS Inner Detector will be replaced with a new all-silicon Inner Tracker. The expected tracking and vertexing performance with the HL-LHC tracker is also presented in this talk, highlighting the challenges encountered in data taking in a high pileup environment.

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