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Track-counting luminosity measurements in ATLAS

At the LHC, the number of inelastic proton-proton collisions per second is related to the luminosity. Track counting is one of the methods for luminosity measurement in the ATLAS experiment. It is done by counting the number of charged-particle tracks reconstructed in the inner detector in unbiased triggers, where the number of tracks scales with the number of interactions. Therefore, as long as the performance of track reconstruction and selection are independent of the luminosity and time, the average number of tracks per event can be used to measure the luminosity. A new track selection, which is less sensitive to changes in the inner detector conditions and shows a more stable performance over a large luminosity range, was introduced in 2017. Results from 2017 and 2018 data have shown a good agreement between track counting and other algorithms, including LUCID which is the dedicated online luminometer of the ATLAS detector.

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