## **EPS-HEP2023** conference



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## Measuring the luminosity of heavy ion collisions with a new algorithm using charged particle tracks at the ATLAS detector

Determining the number of collisions delivered by the LHC inside the ATLAS detector is a key part of the ATLAS luminosity program. Several sub-detectors and algorithms are used, among which is the track counting method. This method assumes that the number of charged particle tracks reconstructed from the ATLAS Inner Detector is proportional to the number of simultaneous collisions, thereby providing a measurement of luminosity. Track counting is well understood in proton-proton collisions, but needs to be adjusted for heavy ion collisions, where the track multiplicity is dominated by rare head-on collisions. In this poster, potential improvements to the track counting method for heavy ions will be discussed. In particular, an event-counting-with-tracks algorithm, where events are accepted if they have at least one track passing a set of track selection criteria, will be presented. The poster discusses the performance of the new algorithm based on PbPb collision data recorded by ATLAS in 2018 and 2022, and compares it to the reference luminometer LUCID-2. This work demonstrates the potential of the event-counting-with-tracks algorithm as a new luminometer for heavy ion collisions recorded by ATLAS in Run 3 and beyond.

## **Collaboration / Activity**

ATLAS

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