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Novel technique for luminosity measurement using 3D pixel modules in the ATLAS detector.

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The Insertable b-Layer (IBL) is the innermost layer of the ATLAS tracking system. It consists of planar pixel modules in the central region and 3D modules at two extremities. We use the cluster length distributions in 3D sensor modules of the IBL to determine the number of primary charged particles per event and suppress backgrounds. This Pixel Cluster Counting (PCC) algorithm provides a bunch-by-bunch luminosity measurement. An accurate luminosity measurement is a key component for precision measurements at the Large Hadron Collider and one of the largest uncertainties on the luminosity determination in ATLAS arises from the long-term stability of the measurement technique. The comparison of the PCC algorithm with other existing algorithms provides key insights in assessing and reducing such uncertainty.

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