

The ATLAS Inner Detector Trigger performance in pp collisions at 13 TeV during LHC Run 2

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The Inner Detector (ID) trigger plays an essential role in the ATLAS trigger system, enabling the high purity reconstruction of physics objects - electron, tau, muon, bjet candidates etc..., providing access to regions of the phase space populated by these objects which span a wide range of kinematic regimes. These are essential for the core physics programme at ATLAS: Standard Model measurements; Flavour physics; and Beyond the Standard Model searches. Having highly efficient tracking trigger algorithms is therefore essential to pursue the ATLAS physics goals, both in the Run-2 analyses and for the preparations for Run-3. Here, the design and performance of the ATLAS ID trigger used at the Large Hadron Collider during the full Run-2 data taking period is discussed, as well as proposed developments for the start of Run-3 and beyond. The detailed efficiencies and resolutions for the trigger for a wide range of physics signatures, including muons, electrons, taus and b-jets, are presented. These results demonstrate the continued excellent performance of the ID trigger in the extreme pile-up conditions of Run-2. During the current 2019-2021 long shutdown, the ATLAS High-Level Trigger software is being redesigned to cope with the running conditions of Run-3 and beyond, whilst maintaining or improving upon the excellent performance from Run-2. This poses significant challenges for the design of the algorithms in terms of execution time and physics performance. Following this redesign, the ID Trigger will continue to lie at the heart of the ATLAS trigger and to be central to the successful fulfilment of the ATLAS physics programme.

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