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A Self Seeded First Level Track Trigger for ATLAS

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For the planned high luminosity upgrade of the Large Hadron Collider, aiming to increase the instantaneous luminosity to $5-7 \times 10^{34}/\text{cm}^2/\text{s}$, the implementation of a first level track trigger has been proposed, which could be installed in the year 2020/21 along with the complete renewal of the ATLAS Inner Detector.

The fast readout of the hit information from the Inner Detector is considered as main challenge of such a track trigger. Different concepts for the implementation of a first level trigger are currently studied within the ATLAS collaboration.

The so called "Self Seeded" track trigger concept exploits fast front-end filtering algorithms based on cluster size reconstruction and fast vector tracking to select hits associated to high momentum tracks. Simulation studies have been performed and results on efficiencies and expected bandwidth reductions are presented for different layouts.

Possible hardware implementations of the first level track processor able to reconstruct all high momentum tracks in every collision within a latency of 1 μs will be discussed.

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