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A Level-1 Track Trigger for CMS with double stack detectors and long barrel approach

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The upgrade of the LHC machine is planned to deliver luminosities 5 to 10 times larger than the design one of $1e34 \text{ cm}^{-2}\text{s}^{-1}$. A novel tracking system for the CMS experiment must be designed and built. One main aspect of the current activities consists in understanding the capabilities that different designs such a tracker would have to provide for the Level 1 hardware trigger to complement the muon and calorimeter information. Data rate reduction at hardware level consists in both reducing multiple hits from a single track and rejection of low Pt tracks. Pattern-based hit correlation of properly built clusters of hits would provide quality Level 1 primitives to the hardware trigger. These can be combined together in a projective geometry to perform a rough tracking to be implemented online, returning rough Pt, direction and vertex information for a candidate track. The benchmark results from simulations within the official CMS framework are presented for one particular layout based on barrel trigger layers, emphasizing the flexibility of this tool for the design and test of different tracking strategies at level 1 to be compared with the developments in trigger architectures implementation.

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