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Track seeding in the Outer Tracker of CMS for HL-LHC

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The CMS experiment is in the process of designing a complete new tracker for the high-luminosity phase of LHC. The latest results of the future tracking performance of CMS will be shown as well as the latest developments exploiting the new outer tracker possibilities. In fact, in order to allow for a track trigger, the modules of the new outer tracker will produce stubs or vector hits containing both position and direction information. In this contribution we present algorithms for finding track seeds in the outer tracker without using any information from the pixel tracker. This is particularly important for finding tracks from displaced vertices, but also helps to mitigate the effects of missing pixel hits. We compare the performance of a simple combinatorial search with various clustering methods employing multi-layer perceptrons and recurrent neural networks, both in terms of efficiency and computational cost. We also present results from neural networks trained to reduce the combinatorics by pre-filtering of vector hits.

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