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Patatrack: accelerated Pixel Track reconstruction in CMS

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The upgraded CMS Pixel Tracker Detector installed during the 2016-2017 extended year-end technical stop consists of four layers in the barrel region and three disks on both sides in the forward region. This made it possible to perform a real fit on quadruplet of hits selected by a Cellular Automaton algorithm to form the pixel tracks. Pixel tracks are an important component of the CMS High-Level Trigger (HLT) reconstruction since they are also used as seeds for additional tracking iterations that make use of the full tracker information. Having a good knowledge of the parameters of the tracks allows a better cleaning and reduces the fake tracks saving CPU time. In this talk, we will describe our experience in implementing two non-iterative and multiple scattering aware fit techniques in the CMS Experiment: the Riemann Fit and Broken Line Fit. We will compare their performances against the standard Run-2 reconstruction both in terms of timing and track-parameter resolution. We will also illustrate our experience in implementing both algorithms on GPU architectures, with a particular emphasis on the engineering work that has been necessary to make the integration.

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