

CMS Tracker Performance and Readiness for LHC Run II



- Composed by a pixel and a strip sub-detectors, the CMS tracker is the largest silicon tracker ever built.
- To mitigate radiation induced effects, during the LHC Long Shutdown 1 the tracker has been prepared to operate at lower temperatures with respect to Run 1.
- The installation of a new dry gas plant and the sealing of the tracker volume will prevent the humidity formation due to the lower temperatures.







- Tracking in CMS is an iterative procedure based on Kalman Filter.
- Each track is reconstructed following 4 different steps:
 1) Souding: 2) Pattern recognition: 2) Fitting: 4) Soloction
 - 1) Seeding; 2) Pattern recognition; 3) Fitting; 4) Selection.
- These steps are iterated many times, reconstructing first the tracks that are easier to find and removing the corresponding hits to reduce the combinatorial complexity.

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- The high pile-up scenario is the main challenge for Run 2, causing a large increase in the strips occupancy and a dynamic inefficiency of pixels.
- Many software developments have been embedded in the new tracking software to cope with the pileup increase.
 - Timing-oriented developments: new algorithm for strip-seeded steps • cluster charge cut to mitigate out of time pile-up events.
 - Physics-oriented developments: 2 new iterations to recover muon reconstruction efficiency • 1 new iteration dedicated to high p_T jets.



Comparison between tracking in Run I and Run II with nominal pile-up conditions



CMS Run II tracking performances are comparable with those in Run I, but in a much more challenging environment.

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