

## Alignment of the CMS Tracker at LHC Run-II

*Monday, 22 May 2017 16:00 (18 minutes)*

The inner tracking detector of the Cosmic Muon Solenoid (CMS) at the CERN Large Hadron Collider (LHC) is 2.6m wide and 5.2m long, and is made of 1440 silicon pixel and 15148 silicon strip modules in the inner and outer part, respectively. Its high granularity has provided an excellent hit resolution of the order of  $10\mu\text{m}$  during LHC Run-I and II.

In order to achieve such a precision despite the finite fabrication tolerances of the large structures and despite the changes of temperature and magnetic field, the tracking system needs to be aligned,

i.e. a correction on the position, orientation and curvature needs to be computed for every single sensor. This challenging problem of  $O(10^6)$  parameters can be solved using collision and cosmic-ray data by the MillePede II and HipPy algorithms, where the alignment parameters are determined by minimising the track-hit residuals of large samples of tracks.

In this talk, we present the final alignment for 2016 data to illustrate the basic principles of those algorithms and to discuss some data-driven methods that are used to validate the performance of the alignment.

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