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CMS Tracker Alignment and Constraints on Its Systematic Distortions JEFFREY DAVIS, Johns Hopkins University, CMS COLLABORATION — The all-silicon design of the tracking system of the CMS experiment provided excellent resolution for charged tracks and an efficient tagging of jets during Run1 and Run2 of LHC. The tracker consists of 15148 silicon strip and 1856 silicon pixel modules. The positions and orientations of the tracker module need to be determined with a precision of a few micrometers and are derived from reconstructed tracks of the collisions and cosmic ray data. The geometries are carefully validated with data-driven methods. We study possible systematic deformation introduced in the CMS tracker alignment and provide prescriptions for setting limits on those in analysis of the data. Nine first-order deformations natural for the cylindrical geometry of the CMS tracker are introduced. We determine constraints on these systematic misalignments by examining the effects of misalignment in simulated Monte Carlo samples and then comparing to collision and cosmic track data.

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