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CMS Tracker alignment strategy and first results obtained from cosmic muon tracks

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The all-silicon design of the CMS Tracker poses new challenges in aligning the system with more than 15000 independent modules. For optimal track-parameter resolution, the position and orientation of its modules need to be determined with a precision of better than few dozens of micrometers. Starting with the survey measurements and corrections provided by the hardware alignment system, we can achieve the ultimate precision with data from the silicon modules traversed in-situ by charged particles. Several implementations of statistical algorithms allow us to solve the optimization problem with the required accuracy in manageable time. We describe survey measurements and experience with the hardware alignment system. We discuss selection of data samples used for track based alignment and present results from Monte-Carlo studies. First CMS Tracker alignment analysis results with cosmic track data will be given.

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