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Alignment of the CMS tracker with Run 3 data

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Summary

The Compact Muon Solenoid (CMS) has the world's largest silicon tracker, comprising 1856 pixel modules and 15148 strip modules that ensure accurate track reconstruction. In order to maintain high precision one must compensate for significant time variations caused by magnet cycles, temperature variations and ageing of modules that lead to changes in the track reconstruction. Consequently, throughout data-taking it is necessary to continuously correct the position, rotation and curvature of these modules in a procedure called tracker alignment. The focus of this talk is on the performance of the CMS tracker alignment in Run 3, with particular attention to the strategies employed to derive alignment calibrations for the reprocessing of the 2022 and 2023 data. Results showing the impact of tracker alignment on physics are also presented.