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Alignment of the Muon System at the CMS Experiment RYAN MUELLER, LUCA PERNI, YURIY PAKHOTIN, TERUKI KAMON, ALEXEI SAFONOV, MALACHI BROWN, Texas AM University — The muon detectors of the CMS experiment provide fast trigger decisions, muon identifications and muon track measurements. Alignment of the muon detectors is crucial for accurate reconstruction of events with high p_T muons that are present in signatures for many new physics scenarios. The muon detectors relative positions and orientations with respect to the inner silicon tracker may be precisely measured using reconstructed tracks propagating from the interaction point. This track-based alignment procedure is capable of aligning individual muon detectors to within 100 microns along sensitive modes. However, weak (insensitive) modes may not be well measured due to the systems design and cause systematic miss-measurements. In this report, we present a new track-based procedure which enables all 6 alignment parameters - 3 positions and 3 rotations for each individual muon detector. The improved algorithm allows for measurement of weak modes and considerably reduced related systematic uncertainties. We describe results of the alignment procedure obtained with 2016 data.

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