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Luminosity Calibration at the CMS Experiment

Precision luminosity measurements are essential to determine the fundamental properties of the physics processes at the LHC. The estimation of the integrated luminosity at the CMS experiment requires absolute scale calibration under special LHC machine setup. Series of beam separation (van der Meer) scans are performed during these special runs. The transverse profile of the proton beams are estimated by the continuous monitoring of the interaction rates together with the beam properties. The dominant systematic sources are related to the precise estimation of the beam separation and the non-factorizability of the proton density distributions in the transverse direction. The correction factors and their uncertainties are derived for each source and propagated to determine the final absolute scale and the corresponding uncertainty. The obtained van der Meer scan calibration is applied to the data-taking period in order to estimate the integrated luminosity. The latest results of the luminosity calibration studies are reported from the CMS experiment.

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