

Luminosity determination using Z boson production at the CMS experiment

The measurement of Z boson production is presented as a means to determine the integrated luminosity. The analysis makes use of proton-proton collision data, recorded by the CMS experiment at the CERN LHC in 2017 at a center-of-mass energy of 13 TeV. Events with Z bosons decaying into a pair of muons are selected. An in situ “tag-and-probe” measurement is used to determine the trigger and identification efficiency for Z bosons in small intervals, 20 pb^{-1} , of integrated luminosity, thus facilitating the efficiency measurement as a function of instantaneous luminosity and time. The correlations between the efficiencies for the different muon track components and between the two muons are also studied. Using the ratio of the efficiency-corrected numbers of measured Z bosons, the precisely measured integrated luminosity of one data set is used to determine the luminosity of another. It is shown that the measurement of Z boson rates constitutes a precise and complementary method to monitor and transfer the luminosity calibration between data sets, and that it can improve the measurement of the integrated luminosity.

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