Measurement of Z→μμ cross section in pp collisions at

J. W. Nam

Seoul National University, Department of Physics and Astronomy

Abstract

Introduction

Z boson is a particle which mediate the weak interaction. The production of Z bosons in pp collisions is mainly via the weak Drell-Yan process. Z boson immediately decays into lepton-antilepton pairs. Cross section of Z → can be measured by reconstructing muon data from the CMS detector.

Theoretical predictions are available at next-to-next-leading order (NNLO) in perturbative quantum chromodynamics (QCD). Precise measurements of Z → cross section provide tests of perturbative QCD and validate the theoretical predictions of higher-order corrections. Monte Carlo simulation method is used for theoretical prediction.

The CMS detector

The Compact Muon Solenoid (CMS) detector is a multi-purpose apparatus due to operate at the Large Hadron Collider (LHC) at CERN. CMS contains a silicon pixel and strip tracker, an electromagnetic calorimeter (ECAL), a hadron calorimeter (HCAL), superconducting solenoid, and a muon detector. The solenoid provides 3.8T magnetic field and this bends muon trajectory oppositely inside and outside. Muons are detected from silicon pixel and strip tracker, and muon detector.

A right-handed coordinate system is used with the origin at the nominal interaction point, the x-axis pointing to the center of the LHC ring, the y-axis pointing up (perpendicular to the LHC plane), and the z-axis along the anticlockwise-beam direction. The polar angle θ is measured from the positive z-axis and the azimuthal angle φ is measured in the xy-plane. The pseudorapidity is given by η = − ln tan(θ/2).

Z boson candidates are required to have reconstructed dimuon mass between 60 and 120GeV. Muons are triggered by and . Muons are reconstructed from seed tracks in the muon detector with silicon pixel and strip tracker.

Analysis

Event reconstruction, data selection.

Comparision with simulation

Dimuon mass plots

Data/mc description

Muon id, event selection

Acceptance and efficiency calculation

result

Cross section value.

How to calculate cross section

Conclusions

Reference