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Measurement of the cross-section for Z μμ production with 1 fb−1 of pp collisions at s√=7
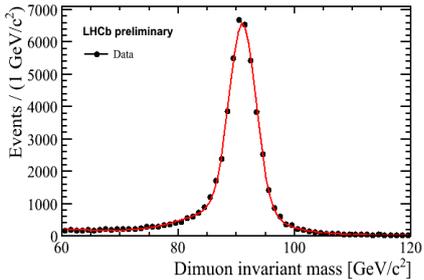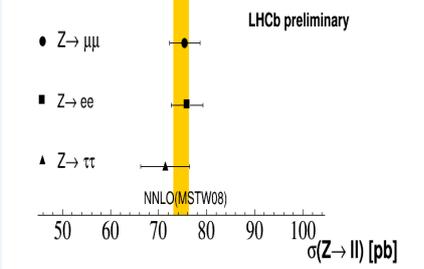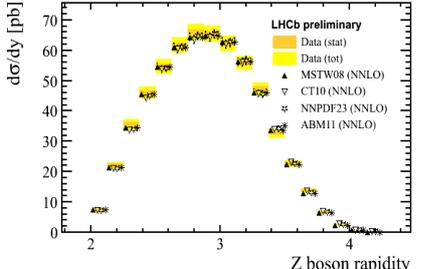
Documentation is available here (LHCb-CONF-2013-007) ⧉.
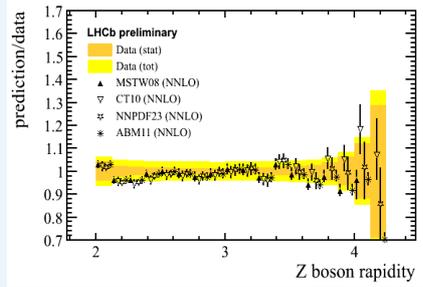
More detailed information: ANA note 2013-025 ⧉

Abstract

A measurement of the cross-section for Z μμ is presented using LHCb data recorded in 2011. The cross-section is measured for muons with a transverse momentum larger than 20 GeV/c in the pseudorapidity range 2.0 < <4.5. The invariant mass of the dimuon system is restricted to 60 < M < 120 GeV/c2. The cross-section is also measured differentially as a function of the rapidity, transverse momentum and of the Z boson.

Figures

(Note, eps versions are available under attachments).

Caption	Figure
Invariant mass of the selected muon pairs. A double Gaussian function is fitted to the distribution.	
A comparison of the total Z μμ cross-section measured in this analysis with the Z ee and Z cross-sections measured at LHCb. The fixed order NNLO prediction from Fewz using the MSTW08 PDF set is also shown.	
Differential cross-section for Z μμ as a function of y of the Z boson. The dark shaded (orange) bands correspond to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the fixed order NNLO predictions from Fewz using the MSTW08, CT10 and NNPDF23 PDF sets.	

Ratio of the QCD predictions to data for the differential cross-section for Z → μμ as a function of y of the Z boson. The dark shaded (orange) bands correspond to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the fixed order NNLO predictions from Fewz using the MSTW08, CT10 and NNPDF23 PDF sets.
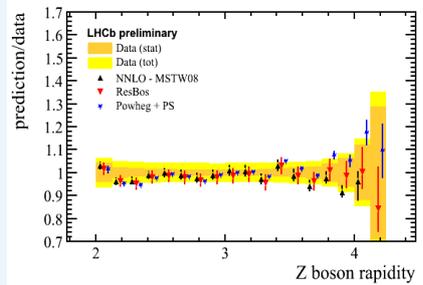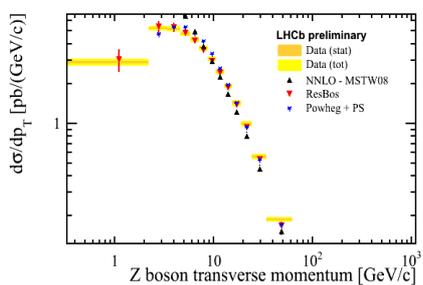
Differential cross-section for Z → μμ as a function of y of the Z boson. The dark shaded (orange) bands correspond to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the predictions from Fewz (NNLO), Resbos and Powheg.
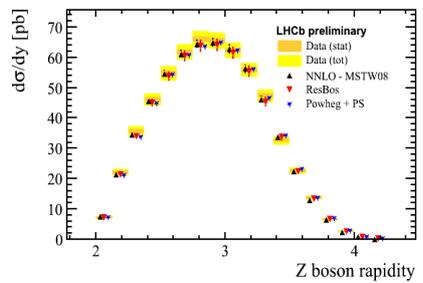
Ratio of the QCD predictions to data for the differential cross-section for Z → μμ as a function of y of the Z boson. The dark shaded (orange) bands correspond to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the predictions from Fewz (NNLO), Resbos and Powheg.
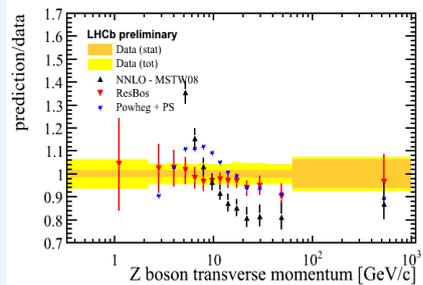
Differential cross-section for Z → μμ as a function of pT of the Z boson. The dark shaded (orange) band corresponds to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the prediction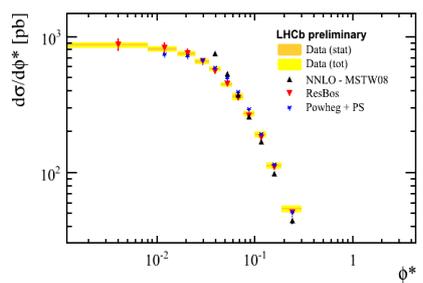s from Fewz (NNLO), Resbos and Powheg. The differential cross section in the largest bin is very low and not displayed in the figure.

Ratio of the QCD predictions to data for the differential cross-section for Z → μμ as a function of pT of the Z boson. The dark shaded (orange) band corresponds to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the predictions from Fewz (NNLO), Resbos and Powheg. The differential cross section in the largest bin is very low and not displayed in the figure.

Differential cross-section for Z → μμ as a function of φ* of the Z boson. The dark shaded (orange) band corresponds to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the predictions from Fewz (NNLO), Resbos and Powheg. The differential cross section in the largest bin is very low and not displayed in the figure.

Figures   2

Ratio of the QCD predictions to data for the differential cross-section for Z μμ as a function of of the Z boson. The dark shaded (orange) band corresponds to the statistical uncertainties, the light hatched (yellow) band to the statistical and systematic uncertainties added in quadrature. Superimposed are the predictions from Fewz (NNLO), Resbos and Powheg. The differential cross section in the largest bin is very low and not displayed in the figure.
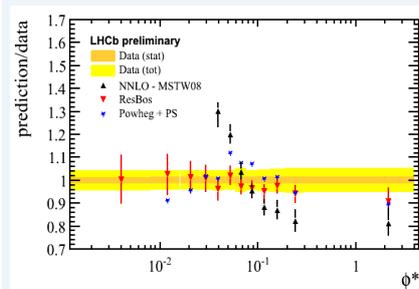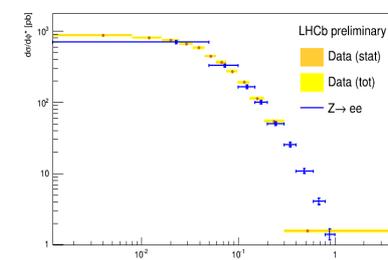

Comparison of the differential results as a function of the Z boson rapidity with the values from the LHCb Z ee measurement
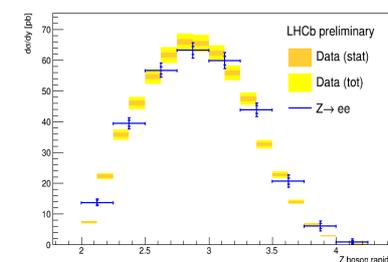
Comparison of the differential results as a function of the Z boson with the values from the LHCb Z ee measurement
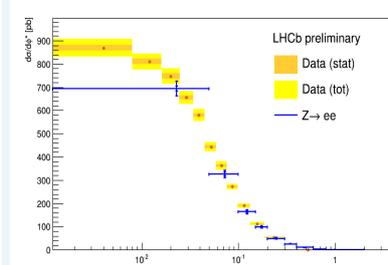
Comparison of the differential results as a function of the Z boson with the values from the LHCb Z ee measurement

Differential cross-section for Z boson production as a function of the rapidity of the Z boson. The LHCb results in the muon (this note) and the electron [2] channels are extrapolated to the fiducial volume of the ATLAS measurement (66 < Mll < 116 GeV/c2, pT > 20 GeV/c) which is shown in green.
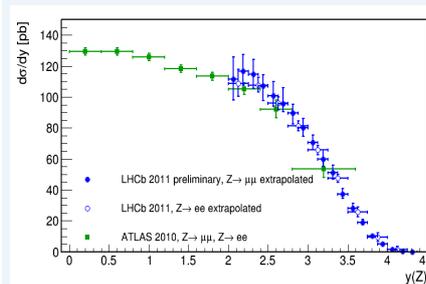
This topic: LHCb > Zmm2011
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