

W charge asymmetry studies

Measurement of inclusive W bosons production cross section -
leptons distributions

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The goal

"The goal of this presentation is to present and compare the distributions of leptons p_T from W^+ and W^- decays at $\sqrt{s} = 13$ TeV with MC calculations."

Object and event selection

For this analysis, the events are collected when triggered by the presence of at least one **electron** with large transverse energy and η cut:

- ▶ $E_T > 23 \text{ GeV}$
- ▶ $|\eta| < 2.5$

or at least one **muon** with large transverse momentum, η cut:

- ▶ $p_T > 20 \text{ GeV}$
- ▶ $|\eta| < 2.4$

Event simulation

Several Monte Carlo event generators are used to simulate the signal and background processes:

- ▶ MadGraph5_aMC@NLO - event samples for the W and Z boson signal and **top** background
- ▶ PYTHIA 8 with NNPDF3.0 - parton shower
- ▶ PYTHIA 8 and POWHEG - diboson backgrounds
- ▶ GEANT4 - detector response

The average number of pileup events per beam crossing in the analyzed data collected in 2015 is about **thirteen**

Input ntuple files

Enums for muons:

- ▶ eData & eAntiData
- ▶ eWmunu & eAntiWmunu
- ▶ eEWK & eAntiEWK
- ▶ eQCD & eAntiQCD
- ▶ eBKG

Enums for electrons:

- ▶ eData & eAntiData
- ▶ eWenu & eAntiWenu
- ▶ eEWK & eAntiEWK
- ▶ eQCD & eAntiQCD
- ▶ eBKG

Muons distributions - Part 1

Kinematic cuts:

- ▶ $p_T > 25$ GeV
- ▶ $|\eta| < 2.4$

Muon mass = 0.1057 GeV

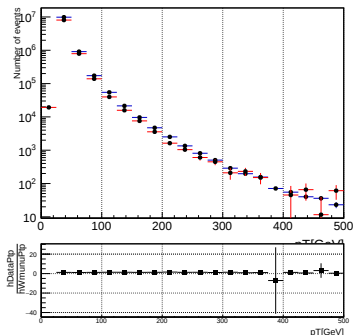


Figure: Muons (μ^+) p_T distribution from eData & eWmunu

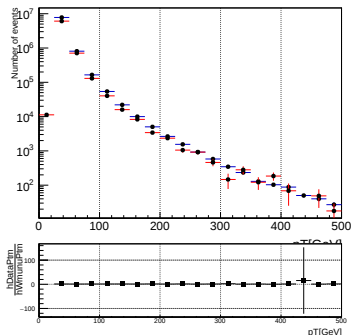


Figure: Muons (μ^-) p_T distribution from eData & eWmunu

Muons distributions - Part 2

Kinematic cuts:

- ▶ $p_T > 25$ GeV
- ▶ $|\eta| < 2.4$

Muon mass = 0.1057 GeV

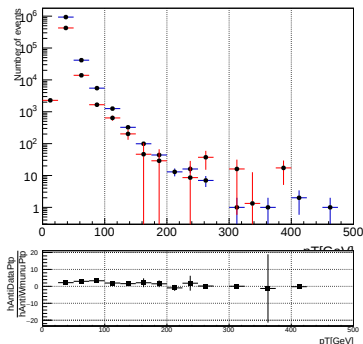


Figure: Muons (μ^+) p_T distribution from eAntiData & eAntiWmunu

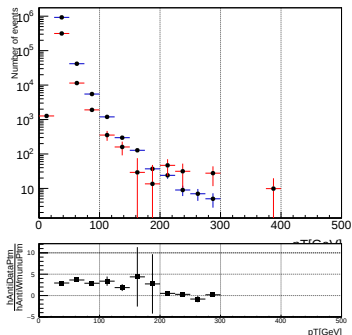


Figure: Muons (μ^-) p_T distribution from eAntiData & eAntiWmunu

Electrons distributions - Part 1

Kinematic cuts:

- ▶ $p_T > 25 \text{ GeV}$
- ▶ $|\eta| < 2.5$

Figure: W asymmetry comparison

Figure: W asymmetry ratio

Electrons distributions - Part 2

Kinematic cuts:

- ▶ $p_T > 25 \text{ GeV}$
- ▶ $|\eta| < 2.5$

Figure: W asymmetry comparison

Figure: W asymmetry ratio