Z Cut
- Two same flavor opposite charge leptons (e^\pm, \mu^\pm) with p_T > 10 GeV
- Muons: Combined tracks or tag tracks
- Electrons: Medium identification requirement

WZ Event Properties

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On behalf of the ATLAS Collaboration

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ABSTRACT

The measurement of the WZ diboson production cross section in proton-proton interactions at \( \sqrt{s} = 7 \text{ TeV} \) is reported from the ATLAS experiment using 1.02 fb^{-1} of data. The measurement is derived from events with purely leptonically decaying bosons with electrons, muons, and missing energy in the final state. Limits on anomalous triple gauge boson couplings (TGC) are derived.

EVENT SELECTION

Z Cut
- Two same flavor opposite charge leptons (e^\pm, \mu^\pm) with p_T > 10 GeV
- Muons: Combined tracks or tag tracks
- Electrons: Medium identification requirement

Third Lepton (W candidate lepton)
- p_T > 20 GeV
- Muons: Combined tracks
- Electrons: Tight identification requirement

Missing transverse energy \( E_T^{\text{miss}} \)
- Combined tracks and tag tracks
- Muons: Combined tracks or tag tracks
- Electrons: Medium identification requirement

Transverse mass \( M_T \)
- \( E_T^{\text{miss}} > 25 \text{ GeV} \)

Trigger
- Muons (p_T > 20 GeV) or Electron (p_T > 25 GeV)

LEPTON ID AND MISSING E_T

Electron identification is based on calorimeter clusters and tracks in the Inner Detector (ID)
- Requires p_T > 15 GeV, |eta| < 2.5 removing track region of (1.37, 1.52)
- Medium identification: Track quality, track matching, shower shape, impact parameter cuts
- Tight identification: E/T matching, e/\gamma rejection

Muon identification is based on tracking information in the Muon Spectrometer (MS) and ID
- Requires p_T > 15 GeV, |eta| < 2.5
- Use MS+ID combined tracks and ID tracks matched to segments in MS (Tag tracks)
- Apply track quality requirements to reject decays in flight and improve track matching

Ensure muon is from primary vertex with |z| < 10 mm requirement

Isolation: Scalar sum of p_T of tracks in cone \(|\Delta R|<0.2\) around electron less than 4 GeV

Electron-like events with p_T < 4 GeV are calibrated as electromagnetic or hadron-like according to cluster topology.

Trigger with single electron and muon triggers.

WZ EVENT PROPERTIES

Z MASS
- \( Z \) mass from leptonic and hadronic decay modes

Z+\gamma
- \( Z \) + \gamma mass from leptonic and hadronic decay modes

Z T SPECTRUM
- \( Z \) mass from leptonic decay modes

Leading Lepton PT
- \( Z \) mass from leptonic decay modes

WZ SYSTEMATIC

WZ SYSTEMATIC
- \( W \) mass from leptonic decay modes

ANOMALOUS TGC LIMITS

New physics at high energy may appear at low energy as anomalous triple gauge couplings (TGC)
- Model with most general C and P invariant effective Lagrangian. In SM, \( g_4, g_5 \) are 1 and \( \lambda = 0 \)

Avoid violating unitarity by adding a cut-off \( \Lambda = 3 \text{ TeV} \)

Anomalous Coupling
- Expected limit of 95% C.L.
- Observed limit of 95% C.L.

SUMMARY

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Using 1.02 fb^{-1}, the measured W^+Z production cross section is in good agreement with the Standard Model. Using the measured cross section, limits on anomalous triple gauge couplings have been derived and compared to the Tevatron.