Event displays of W and Z Bosons with Large Rapidity Gaps

Michele Arneodo, Guenther Dissertori, Michael Dittmar, Juerg Eugster, Hannes Jung, Paolo Meridiani, Alexander Proskuryakov, Ann-Karin Sanchez, Antonio Vilela Pereira

Abstract

We present event displays of W and Z events with large rapidity gaps.
Event displays of W and Z Bosons with a Large Rapidity Gap

contact: cms-pag-conveners-fwd@NOSPAMcernSPAMNOT.ch

15/12/2010
Event Selection

• **General remarks:**
  – Diffractive $W, Z$ production is described by colorless exchange of vacuum quantum numbers (Pomeron)
  – One of the incoming Protons remains intact
  – Events are characterized by the presence of a large rapidity gap (LRG)

• **Diffractive Selection:**
  – No energy deposit in HF (LRG, Calo Tower Energy $> 4$ GeV)

• **Event display options:**
  – Barrel: Calo Tower Energy $> 1.5$ GeV
  – Endcaps: Calo Tower Energy $> 2$ GeV
  – Forward: Calo Tower Energy $> 4$ GeV
  – Tracks: $p_T > 500$ MeV
W/Z events without LRG

W -> e nu

Z -> mu mu
$W \rightarrow \mu \nu$

Run: 146514
Event: 539240623
Lumi Section: 864

Muon: $p_T = 40.3$ GeV
Muon: $\eta = -0.85$
MET: $\not{E}_T = 49.4$ GeV
Transverse mass: $m_T = 82.1$ GeV/$c^2$
$W \rightarrow \mu \nu \bar{\nu}$
W -> mu nu
$W \rightarrow e \nu$

Electron: $p_T = 38.8$ GeV

Electron: $\eta = -0.44$

MET: $\slashed{E}_T = 36.3$ GeV

Transverse mass: $m_T = 74.2$ GeV/$c^2$
W -> e nu
W -> e nu
W -> e nu
Z -> mu mu

Run: 149011
Event: 658434222
Lumi Section: 453

Muon 1: $p_T = 42.6$ GeV
Muon 2: $p_T = 28.1$ GeV
Muon 1: $\eta = -1.4$
Muon 2: $\eta = -0.1$
Invariant mass: $m_{ll} = 84.8$ GeV/$c^2$
Z -> mu mu
Z $\rightarrow$ mu mu

CMS Experiment at LHC, CERN
Data recorded: Tue Oct 26 17:37:14 2010 CEST
Run/Event: 149011 / 658434222
Lumi section: 453
Orbit/Crossing: 118578367 / 94
Z -> mu mu
$Z \rightarrow e^+ e^-$

Run: 144112  
Event: 634441202  
Lumi Section: 563

Electron 1: $p_T = 47.3$ GeV  
Electron 2: $p_T = 45.1$ GeV  
Electron 1: $\eta = 0.42$  
Electron 2: $\eta = 0.84$  
Invariant mass: $m_{ll} = 94.2$ GeV/$c^2$
$Z \rightarrow e^+ e^-$
$Z \rightarrow e^+ e^-$
Z -> e e
Drell-Yan – double LRG candidate

Run: 146644
Event: 999973897
Lumi Section: 563

Muon 1: $p_T = 26.5 \text{ GeV}$
Muon 2: $p_T = 26.5 \text{ GeV}$
Muon 1: $\eta = -0.95$
Muon 2: $\eta = 0.29$
Invariant mass: $m_{ll} = 63.5 \text{ GeV/c}^2$
Drell-Yan – double LRG candidate
Drell-Yan – double LRG candidate
Drell-Yan – double LRG candidate
Drell-Yan – double LRG candidate

Run: 142130
Event: 51601374
Lumi Section: 71

Electron 1: $p_T = 30.7$ GeV
Electron 2: $p_T = 28.4$ GeV
Electron 1: $\eta = -1.1$
Electron 2: $\eta = 1.56$
Invariant mass: $m_\perp = 119$ GeV/$c^2$
Drell-Yan – double LRG candidate
Drell-Yan – double LRG candidate
Drell-Yan – double LRG candidate