Diboson/TGC Measurement in ATLAS

Wγ/Zγ JHEP 09 (2011) 072 (35pb^{-1})
(TBD, 1fb^{-1})

WW arXiv: 1203.6232 (1fb^{-1})
ATLAS-CONF-2012-025(4.7fb^{-1})

WZ Phys. Lett. B 709 (2012) 341-357(1fb^{-1})

ZZ4l Phys.Rev.Lett. 108 (2012) 041804(1fb^{-1})
ATLAS-CONF-2012-026(4.7fb^{-1})

ZZllnn ATLAS-CONF-2012-027 (4.7fb^{-1})

Use published (arXiv) results as baseline if available

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LHC EW WG activities

Working Group on Electroweak precision measurements at the LHC
21-23 May 2012
https://indico.cern.ch/conferenceDisplay.py?confId=178469

LHC EW WG:
To subscribe to the WG mailing list, go to
http://simba3.web.cern.ch/simba3/SelfSubscription.aspx?groupName=LHC-EWWG

This is the preparation work before the workshop to assist the smooth combination of results from ATLAS and CMS

Truth Object for fiducial region definition

Photon:

The sum of energy of stable particles in a cone of R = 0.4 around the photon is less then 50% of the photon energy after parton showering and hadronization.

Lepton (e,μ):

The lepton (e, μ) is redressed with final state photons, i.e. the vector sum of the momenta of all photons in a cone around $\Delta R = 0.1$ of the truth lepton is added to its four momentum after parton showering and hadronization.

Jet:

the truth level are defined by applying the anti-kT jet algorithm with a cone-size of R = 0.4 on stable truth level particles after showering and hadronization.

CMS preference:

→ might dress lepton
→ no photon isolation cut
→ No Met and No Jet in the fiducial region definition

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Fiducial phase space				
	$e^{\pm}\nu\gamma$	$e^{+}e^{-}\gamma$	$\mu^{\pm}\nu\gamma$	$\mu^{+}\mu^{-}\gamma$
$E_T^l(p_T^l)$	$E_T^e > 20$ GeV $p_T^\nu > 25$ GeV	$E_T^e > 20$ GeV -	$p_T^\mu > 20$ GeV $p_T^\nu > 25$ GeV	$p_T^\mu > 20$ GeV -
η_l	$0 < \lvert\eta_e\rvert < 1.37$ or $1.52 < \lvert\eta_e\rvert < 2.47$	$0 < \lvert\eta_e\rvert < 1.37$ or $1.52 < \lvert\eta_e\rvert < 2.47$	$\lvert\eta_\mu\rvert < 2.4$	$\lvert\eta_\mu\rvert < 2.4$
Boson cut	$m_T > 40$ GeV	$m_{ee} > 40$ GeV	$m_T > 40$ GeV	$m_{\mu\mu} > 40$ GeV
Photon	$E_T^\gamma > 15$ GeV $0 < \lvert\eta_\gamma\rvert < 1.37$ or $1.52 < \lvert\eta_\gamma\rvert < 2.37$ $\Delta R(l,\gamma) > 0.7$ $\epsilon_h^p < 0.5$			
Phase space for production cross section				
	$e^{\pm}\nu\gamma$	$e^{+}e^{-}\gamma$	$\mu^{\pm}\nu\gamma$	$\mu^{+}\mu^{-}\gamma$
Boson		$m_{ee} > 40$ GeV		$m_{\mu\mu} > 40$ GeV
Photon	$E_T^\gamma > 15$ GeV $\Delta R(l,\gamma) > 0.7$ $\epsilon_h^p < 0.5$			

CMS preference:

lepton |eta| < 2.5

photon pT>15GeV, |eta|<2.5, dR(photon, lepton)>0.7

WpT (lepton+Met) > 35GeV

ZpT(e,mu) > 20GeV mZ>50GeV

WW arXiv: 1203.6232 ($1fb^{-1}$)

Channel $pp \rightarrow l^+ \nu l^- \nu$

Lepton

μ: $p_T > 20$ GeV $|\eta| < 2.4$ (at least one μ $p_T > 25$GeV in $\mu\mu$)

e: $p_T > 20$ GeV $|\eta| < 1.37$ or $1.52 < |\eta| < 2.47$

($p_T > 25$ GeV in ee, at least one e $p_T > 25$ GeV in eμ)

Neutrino

$E_T^{miss,rel} > 45/40/25$ GeV ($\mu\mu$/ee/eμ)

Jet veto:

$p_T > 25$ GeV $|\eta l| < 2.5$, ΔR(jet, e) < 0.3

Dilepton mass:

$M_{ll} > 15(10)$ in $\mu\mu$ (ee) and $|M_{ll} - M_{Z,PDG}| > 15$ GeV (ee, $\mu\mu$)

TGC (HISZ, Equal Coupling, LEP):

Observables: Leading lepton p_T spectrum

Λ: 3 TeV or ∞

CMS preference (not defined yet), might be from partial analysis cuts:

electron |eta| < 2.5
Muon |eta|< 2.4
lepton pT > 20 GeV
Jet veto: Et > 30 GeV

WZ Phys. Lett. B 709 (2012) 341-357(1fb^{-1})

Channel $pp \rightarrow l^+l^- l\nu$

Lepton

Z lepton $p_T > 15$ GeV

W lepton $p_T > 25$ GeV $|\eta l| < 2.5$

Neutrino

$E_T^{miss} > 25$ GeV

Boson

$|M_{ll} - M_Z| < 10$ GeV $M_T(W^{\pm}) > 20$ GeV

TGC:

Observables: total cross-section

Λ: 2 TeV or ∞

CMS preference (not defined yet, might be from partial analysis cuts):

W lepton: pT>20 GeV, |e, eta| < 2.5 |mu, eta|<2.4

Z electron: pT>20/10 |eta|<2.5

Z muon: pT> 15/15, |eta|<2.4

MZ: 60~120 GeV

ZZ4l Phys.Rev.Lett. 108 (2012) 041804($1 fb^{-1}$)

Channel $pp \rightarrow l^+l^-l^+l^-$

Lepton

$p_T > 15$ GeV $|\eta| < 2.5$

Boson

$|M_{ll} - M_{Z,PDG}| < 25$ GeV

TGC:

Observables: total cross-section

Λ: 2 TeV or ∞

CMS preference (not defined yet, might be from partial analysis cuts):

Z1 lepton: pT(e/mu)>20/10 |eta(e/mu)|<2.5/2.4

Z2 lepton: pT> 5/5, |eta(e/mu)|<2.5/2.4

MZ: 60~120 GeV

ZZllnn Phys.Rev.Lett. 108 (2012) 041804($1fb^{-1}$)

Channel $pp \rightarrow l^+l^- \upsilon\upsilon$

Lepton

$p_T > 15$ GeV $|\eta| < 2.5$

Boson

$|M_{ll} - M_{Z,PDG}| < 25$ GeV

TGC:

Observables: total cross-section

Λ: 2 TeV or ∞

CMS preference (not defined yet, might be from partial analysis cuts):

Z1 lepton: pT(e/mu)>20/10 |eta(e/mu)|<2.5/2.4

Z2 lepton: pT> 5/5, |eta(e/mu)|<2.5/2.4

MZ: 60~120 GeV

Other Issues to be discussed

MCFM cross-section calculation
→ exchange control files

Zero width approximation for total cross-section
→ using Z line-shape with agreed cuts

What to measure
→ Common definition of inclusive cross-section
→ Common definition of fiducial cross-section
→ Cutstomized fiducial cross-section for each experiment?