

$W(e\nu)\gamma$ cutflow in 2011 data + MC10B

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$W/Z+\text{gamma}$
16.06.11

Overview

Outline

- Data sample and analysis code
- Electron, photon and W+gamma selection
- Cut flow for 2011 periods D, E, and MC10B
- Electron and photon pT spectra
- DeltaR
- Invariant mass
- Missing ET

Data sample and analysis code

Data sample

- Ran on 2011 data samples from WZgamma baseline cuts for EPS 2011 Twiki:
- https://twiki.cern.ch/twiki/bin/view/AtlasProtected/BaselinecutsforWZgammaforEPS2011Result#Run_180481_data
 - **Run 180481:** data11_7TeV.00180481.physics_Egamma.merge.NTUP_SMWZ.f369_m812_p503_tid335921_00
 - **Period E (data):** user.zliang.2011.E.Egamma/
 - **Period F (data):** user.zliang.2011.F.Egamma/

Analysis code

- Produce reduced D3PDs with WZgamma benchmark code based on modified WZJet's package:
- <https://twiki.cern.ch/twiki/bin/view/AtlasProtected/WZGammaD3PDbasedbenchmark>

Selection

Following cuts on twiki and discussions with Zhijun:

- Good Run List
- Number of primary vertices ≥ 1
- EF_e20_medium
- MET cleanup
- 1 tight electron
- Veto events with second medium electron
- MET_LocHadTopo_et > 25 GeV
- Transverse mass > 40 GeV
- At least one tight photon with $p_T > 15$ GeV
- Photon isolation, use $etcone20_npvPT < 5$ GeV
- Zmass veto: $abs(M(e:gamma) - M_Z) > 10$ GeV. (Notice a sign error on Twiki)
- Invariant mass $M(e:gamma) > 100$ GeV
- Number of good jets $== 0$

Selection update

Changes since Tuesday:

General:

- Cutflow using new flags in update benchmark code.
- MET cleanup now implemented in cutflow
- MET and transverse mass cuts corrected using new flags.
- Recovered missing events in period D.

Photon selection and isolation

- WZgamma code was checking only whether the lead pT photon passed tight.
- Updated code checks all for any tight, then takes lead pT.
- Now use iscphoTight2_clus with PhotonIDTool

Cutflow for run 180841

Baseline Cut number	Cut definition	Number of events: (new flags alltree)	Number of events: (cuts5-9 onwards, old variables)
-	No cuts	4332056	4332056
-	GRL	3924625	3924625
-	Primary vertex	3916582	3916582
-	EF_e20_medium	1214446	1214446
-	MET clean	1213944	1213944
-	≥ 1 tight electron	138529	138529
-	Veto event with 2nd medium electron	137100	137100
3.	MET > 25 GeV	71119	71119
4.	Transverse mass > 40 GeV	67684	67684
5.	≥ 1 tight photon, $p_T > 15 \text{ GeV}$	108	100
6.	Photon isolation: (etcone20_npvPT < 5 GeV)	58	88
7.	Z mass veto: $\text{abs}(M(e;\text{gamma}) - M_Z) > 10 \text{ GeV}$	40	56
8.	$M(e;\text{gamma}) > 100 \text{ GeV}$	12	19
9.	Number good jets == 0	6	9

Final candidate events for run 180841

New flags with alltree:

```
*****
* Row * RunNumber * lbn * EventNumb *
*****
* 206391 * 180481 * 196 * 7374677 *
* 1247841 * 180481 * 365 * 42423582 *
* 2075879 * 180481 * 505 * 70688165 *
* 2815255 * 180481 * 644 * 96373961 *
* 3460950 * 180481 * 773 * 118794102 *
* 4220164 * 180481 * 934 * 145982694 *
*****
```

Cutflowtree variables:

```
*****
* Row * RunNumber * lbn * EventNumb *
*****
* 92 * 180481 * 196 * 7374677 *
* 548 * 180481 * 365 * 42423582 *
* 758 * 180481 * 445 * 58954233 *
* 896 * 180481 * 505 * 70688165 *
* 1121 * 180481 * 612 * 90679043 *
* 1177 * 180481 * 644 * 96373961 *
* 1696 * 180481 * 934 * 145982694 *
* 1729 * 180481 * 957 * 149790049 *
*****
```

Cutflow for period E (data)

Baseline Cut number	Cut definition	Number of events: (new flags alltree)	Number of events: (cuts5-9 onwards, old variables)
-	No cuts	8109906	8109906
-	GRL	6934633	6934633
-	Primary vertex	6921877	6921877
-	EF_e20_medium	2391715	2391715
-	MET clean	2390698	2390698
-	≥ 1 tight electron	271192	271192
-	Veto event with 2nd medium electron	268393	268393
3.	MET > 25 GeV	140216	140216
4.	Transverse mass > 40 GeV	133099	133099
5.	≥ 1 tight photon, $p_T > 15 \text{ GeV}$	199	190
6.	Photon isolation: (etcone20_npvPT < 5 GeV)	131	175
7.	Z mass veto: $\text{abs}(M(e;\text{gamma}) - M_Z) > 10 \text{ GeV}$	80	101
8.	$M(e;\text{gamma}) > 100 \text{ GeV}$	19	25
9.	Number good jets == 0	12	18

Cutflow for period F (data)

Baseline Cut number	Cut definition	Number of events: (new flags alltree)	Number of events: (cuts5-9 onwards, old variables)
-	No cuts	14941752	14941752
-	GRL	12120577	12120577
-	Primary vertex	12092092	12092092
-	EF_e20_medium	6150315	6150315
-	MET clean	6150315	6150315
-	≥ 1 tight electron	685720	685720
-	Veto event with 2nd medium electron	678782	678782
3.	MET > 25 GeV	355150	355150
4.	Transverse mass > 40 GeV	337104	337104
5.	≥ 1 tight photon, $p_T > 15 \text{ GeV}$	555	528
6.	Photon isolation: (etcone20_npvPT < 5 GeV)	321	476
7.	Z mass veto: $\text{abs}(M(e;\text{gamma}) - M_Z) > 10 \text{ GeV}$	208	320
8.	$M(e;\text{gamma}) > 100 \text{ GeV}$	63	88
9.	Number good jets == 0	63	88