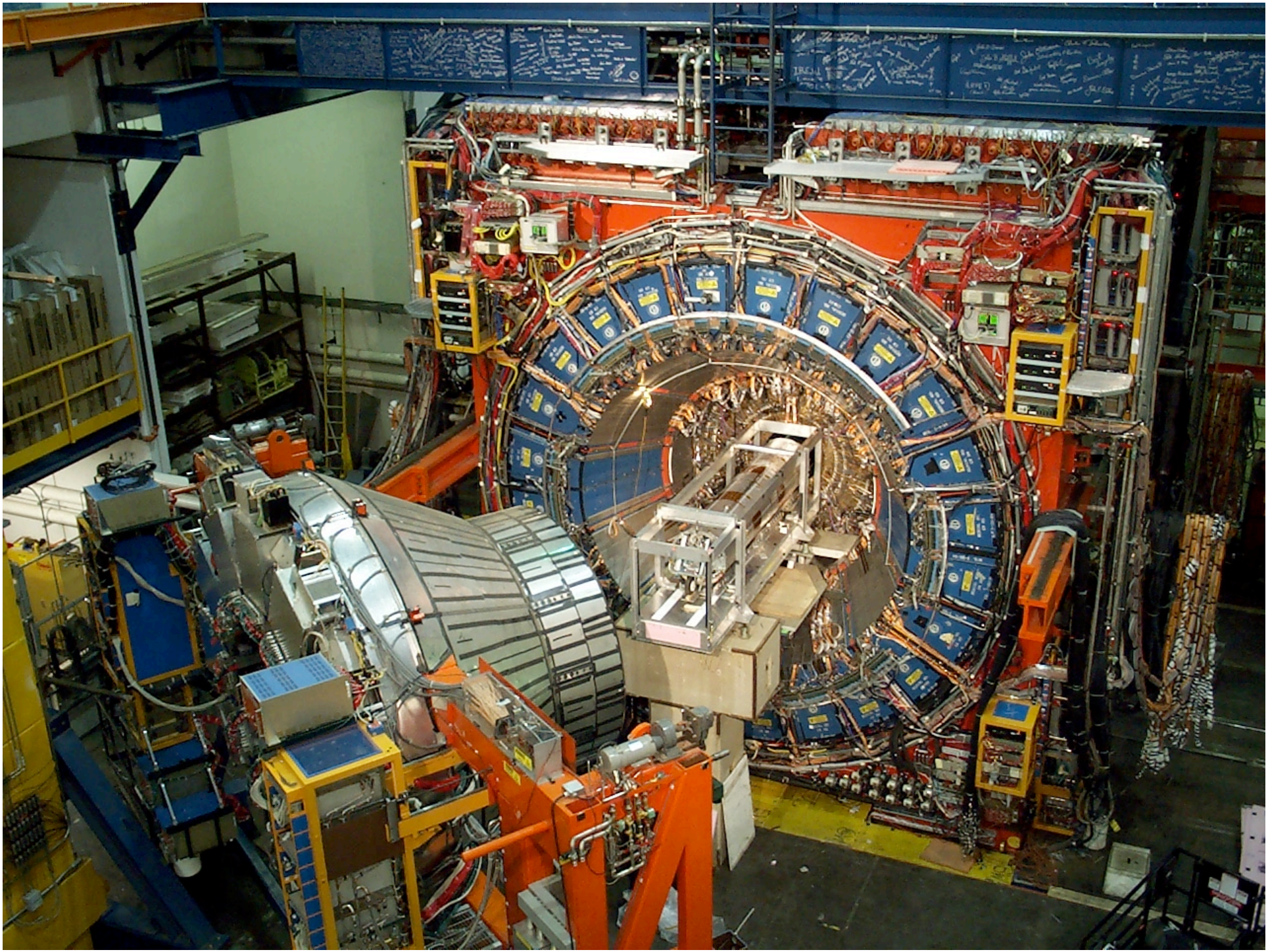
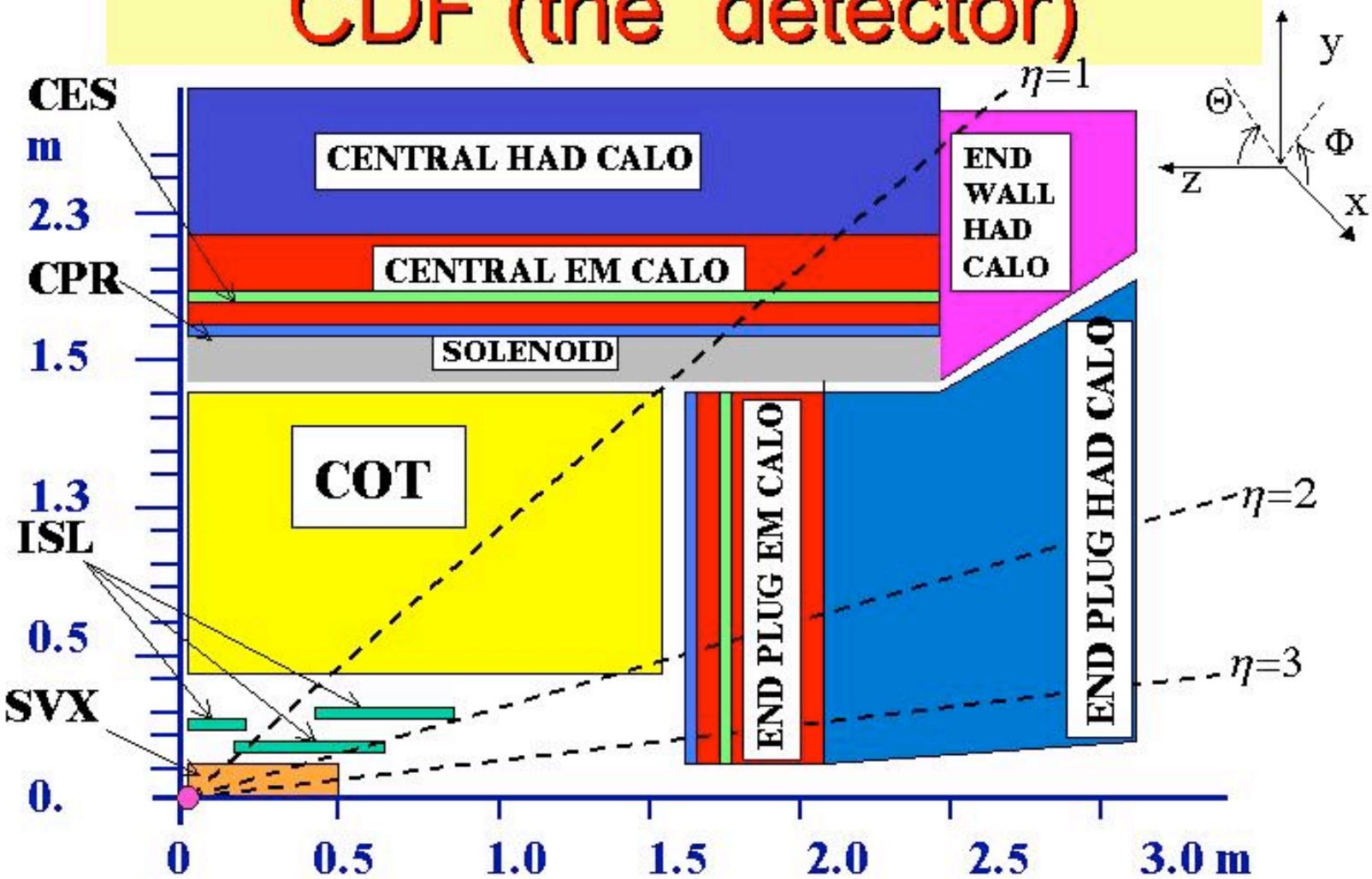


Overview

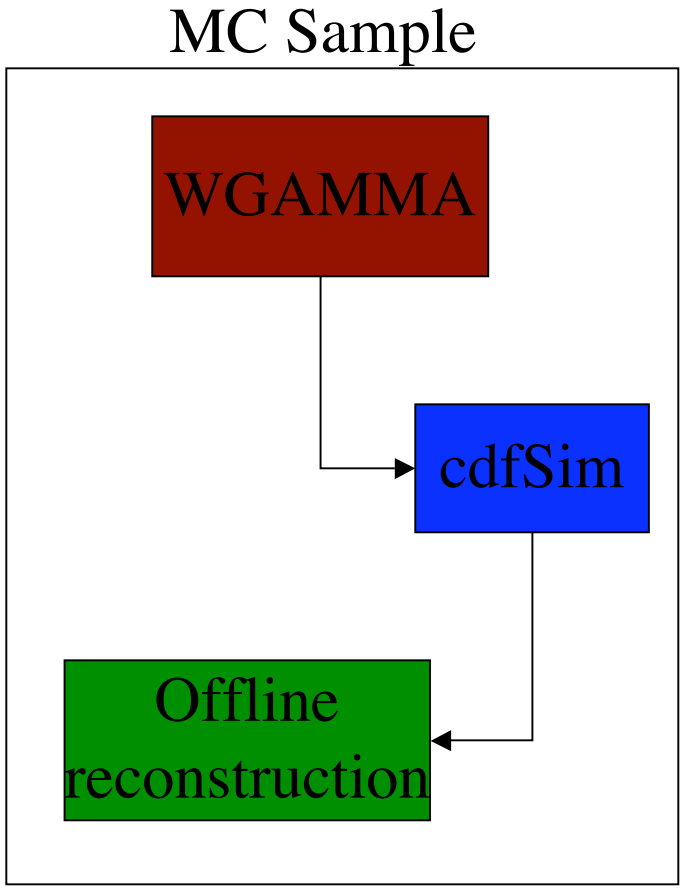
- CDF Detector
- Dataset and MC
- W$\square$event selections
- Acceptance and Efficiency
- Backgrounds
- Results

CDF (the detector)



Dataset and MC

- Dataset
  - Trigger on high Pt electron in central calorimeter
  - Trigger efficiency 96.2%
  - Integrated luminosity 72.0 ±4.3 pb^{-1}
- MC from Ulrich Baur WGAMMA
- Pythia 6.2 and full detector simulation and offline reconstruction

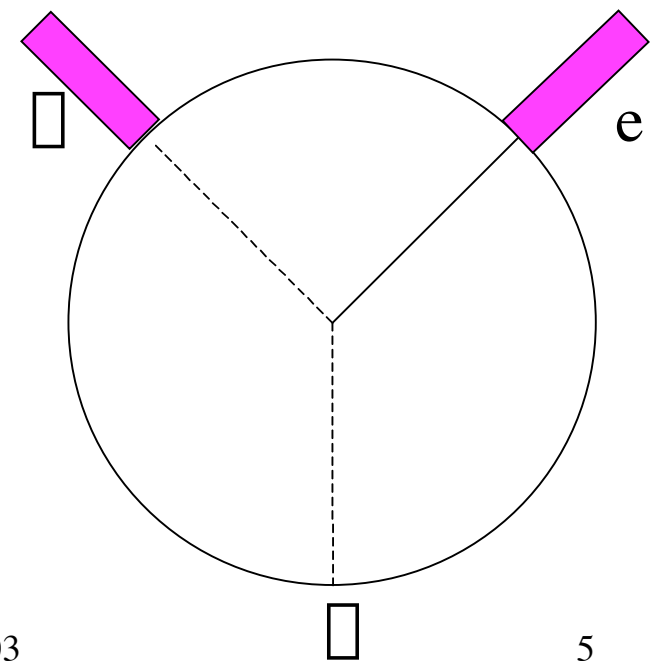


W□ Event selections

Em Cluster Et	> 25 GeV
Matched Track	Pt > 10 GeV
Hadronic Energy Fraction	< 0.055 + 0.00045*E
Energy/Track P	< 2. or Pt > 50 GeV
Isolation Energy	< 0.1
Shower Max Cluster Quality Cut	passed
Lateral Shower Shape	< 0.2

|□| Em Cluster	< 1.1
Em Cluster Et	> 7.0 GeV
N3D Tracks	≤1, pt< 1+ 0.02*Et
Hadronic Fraction	0.055+0.00045*E
Isolation Energy	Et <20: < 0.1*Et Et>20: < 2.0+0.005*Et
TrackIso0.4	< 5 GeV

- Missing E_T > 25 GeV
- $|Z_{Vertex}|$ < 60 cm
- □R(lep,□) >0.7



W Inclusive Acceptance

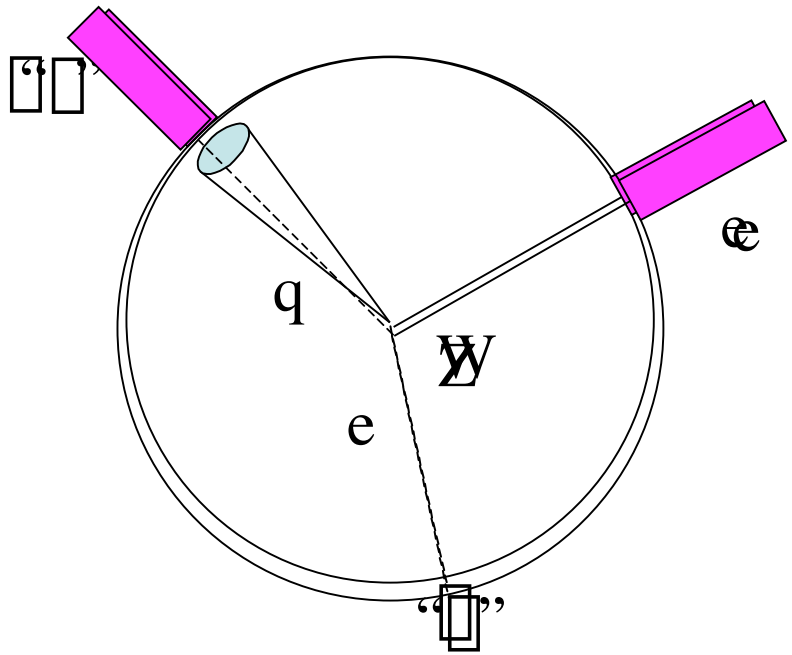
Different kinematics leads to different acceptance…

CDF Run2 Preliminary $72pb^{-1}$

Subset	CDF W Cross Section Analysis	W□□ e□□MC
EmCluster	1428322 (95.7)	57683 (99.2)
TrackPt > 10.	524147 (35.1)	17964 (30.1)
Et > 25.0	394406 (26.4)	8307 (14.3)
Met > 25.0	367098 (24.6)	7586 (13.0)
Net acceptance	24.6%	13.0%

Backgrounds

- QCD Jet faking photon
- One Legged Z□
- W□(W→□□→e□□□)



Acceptance*Efficiency for Signal and Background

	$A*\epsilon$	SM σ*BR (pb)
$W\rightarrow\tau\nu$ $e\tau\tau$	1.07%	21.7
One Legged $Z\rightarrow$	0.30%	5.3
$W\rightarrow\tau\nu$ $\tau\tau\tau$	0.12%	2.4

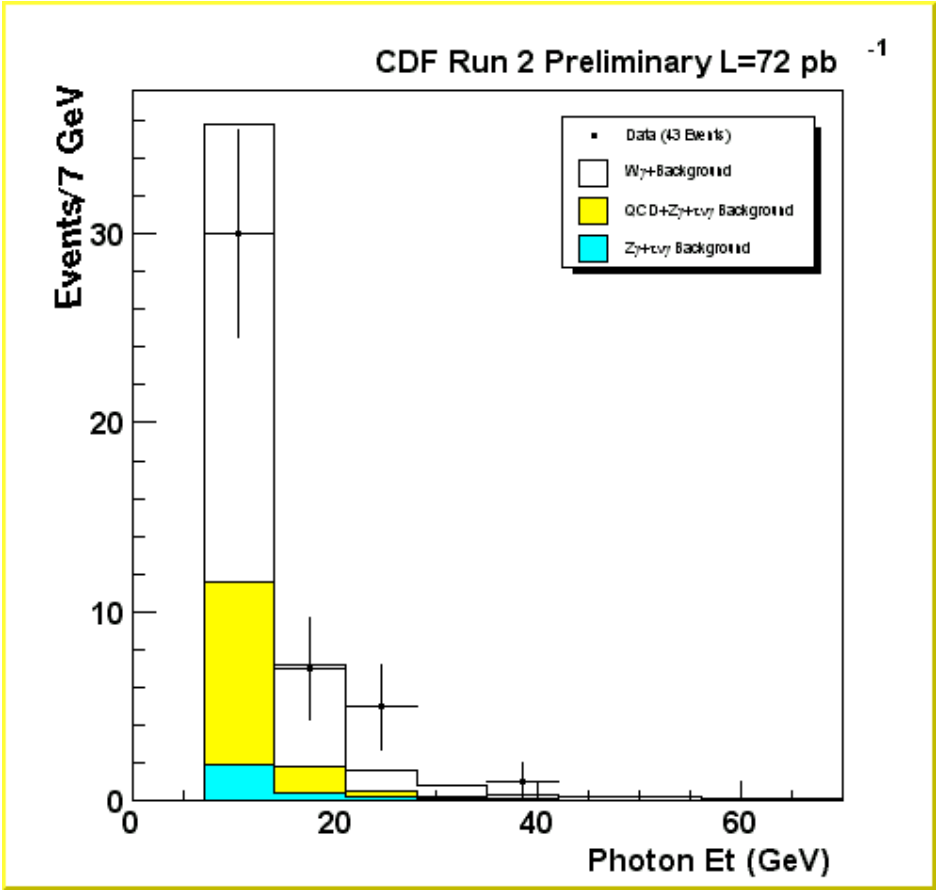
W Results

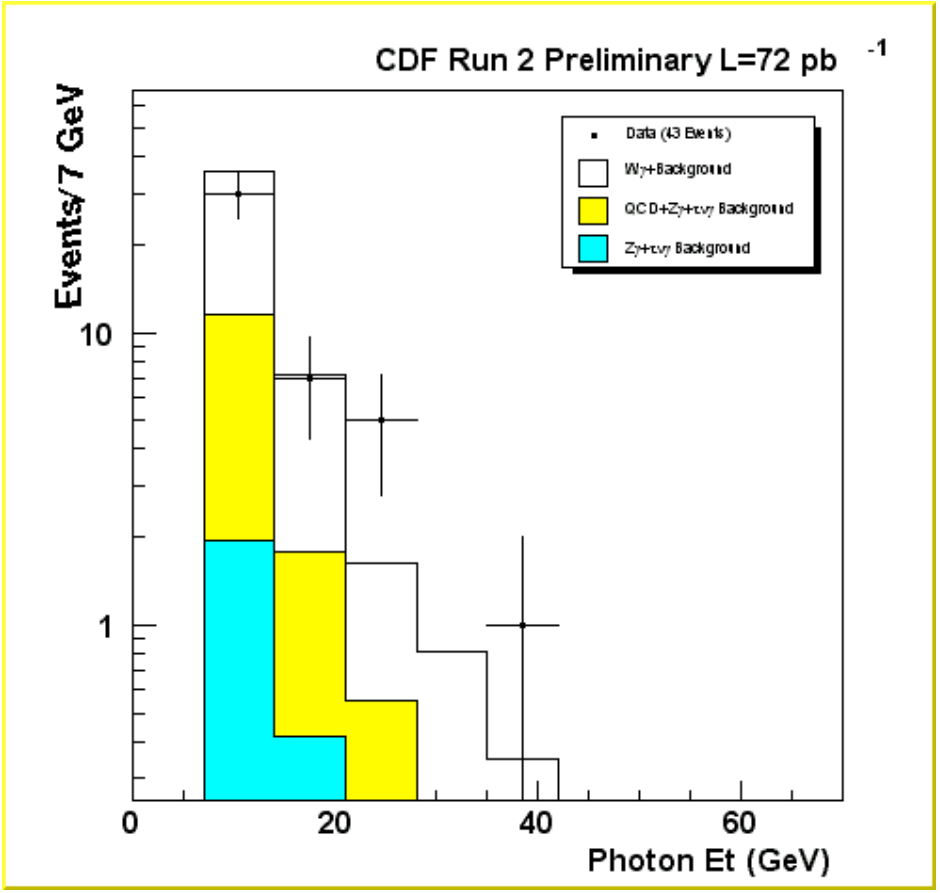
CDF Run2 Preliminary 72pb^{-1}

Electron Channel	(stat) + (syst)	
Signal MC	32.2±1.3 ±2.5	
Jet g	11.5±0.1 ±3.8	
One leg Z	2.4±0.3 ±0.2	
WgÆtng	0.5±0.1 ±0.1	
Signal+Bkg	46.6±1.3 ±4.5 ±2.1(lum)	46.6 ± 5.1
DATA	43	

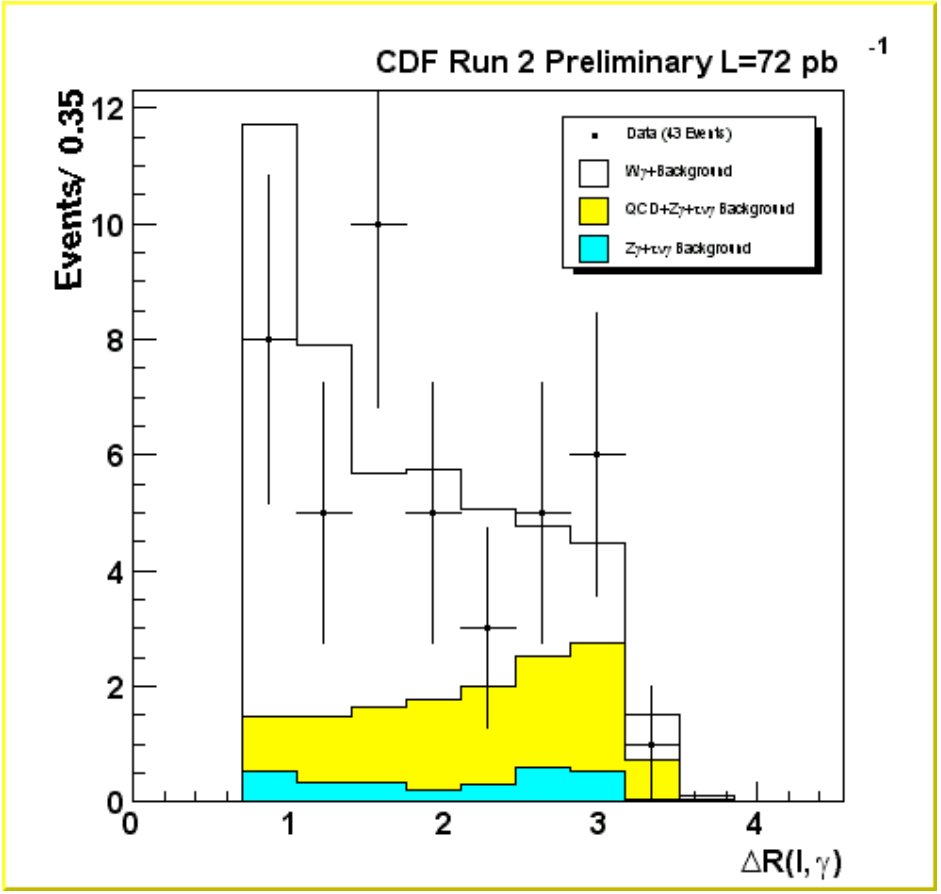
- Et( ) > 7.0 GeV, R(lep,) >0.7
- Measured (W)*BR(ev) = 17.2 ±3.8 ±2.8 ±1.0pb
- SM (W)*BR(ev) = 18.7 ± 1.3 pb
- Signal/Background = 2.24

Photon Et

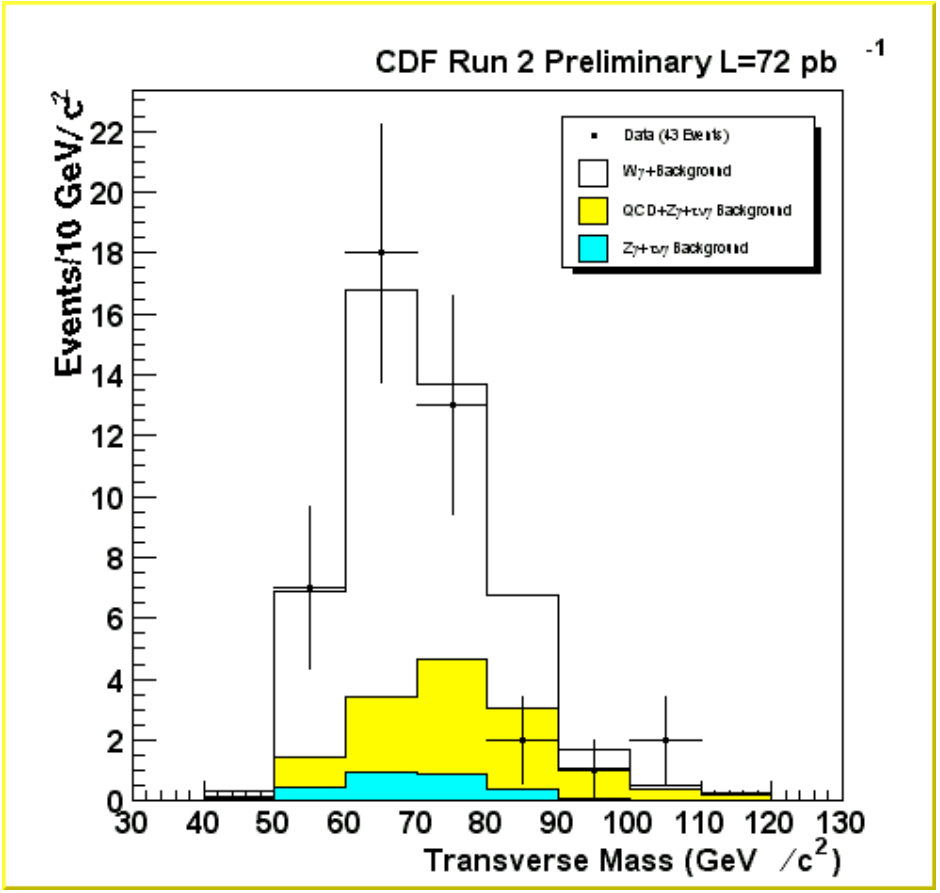

CDF Run 2 Preliminary L=72 pb -1
Events/7 GeV
Data (43 Events)
Wγ+Background
QCD+Zγ+τνγ Background
Zγ+τνγ Background
0
10
20
30
0
20
40
60
Photon Et (GeV)

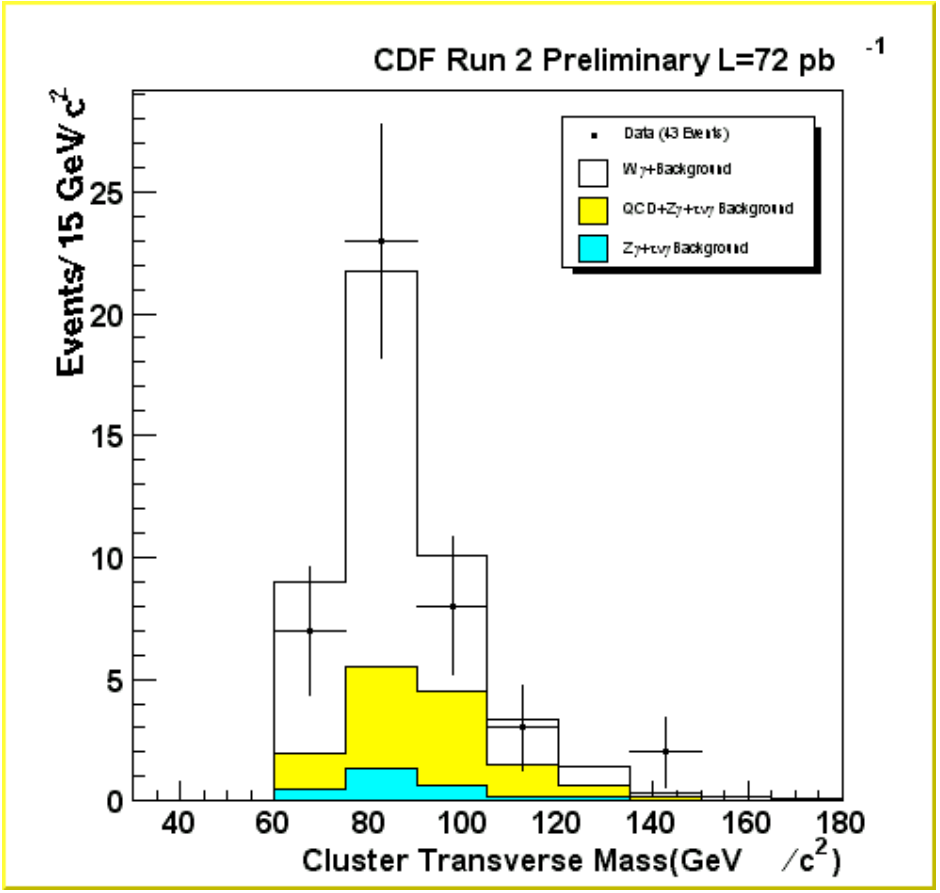

CDF Run 2 Preliminary L=72 pb -1
Events/7 GeV
Data (43 Events)
Wγ+Background
QCD+Zγ+τνγ Background
Zγ+τνγ Background
1
10
0
20
40
60
Photon Et (GeV)

Delta R

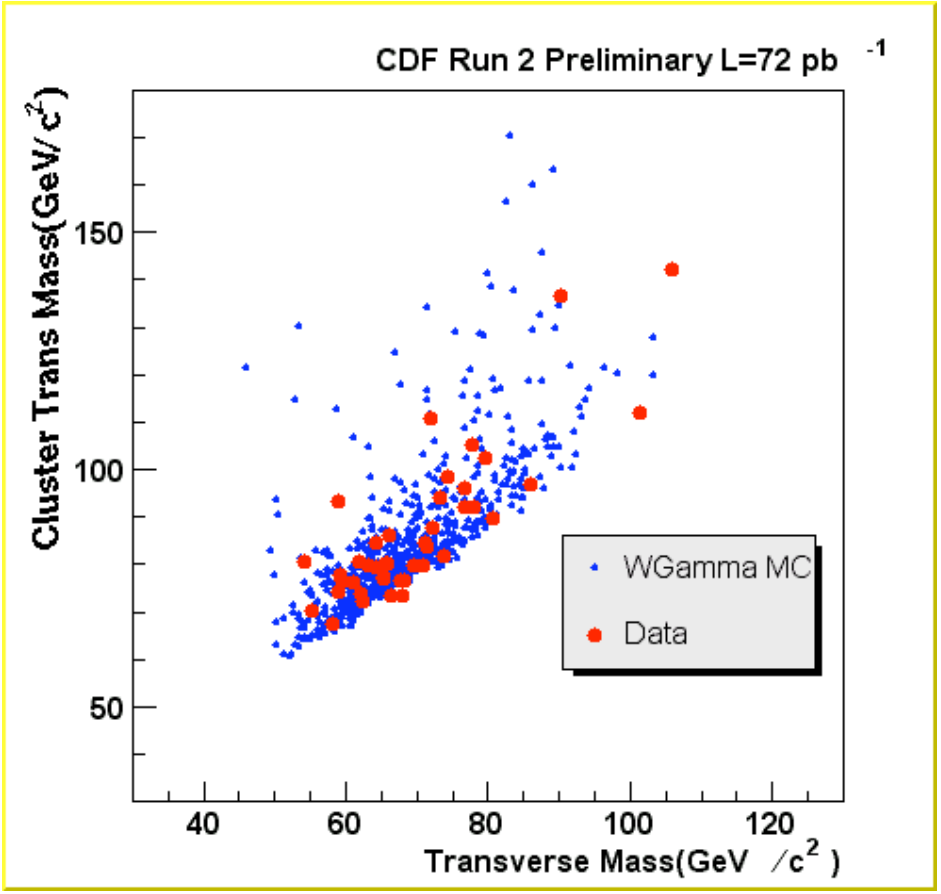

CDF Run 2 Preliminary L=72 pb^{-1}
Events/ 0.35
Data (43 Events)
Wγ+Background
QCD+Zγ+τνγ Background
Zγ+τνγ Background
ΔR(l, γ)
0
2
4
6
8
10
12
0
1
2
3
4

Transverse and Cluster Mass

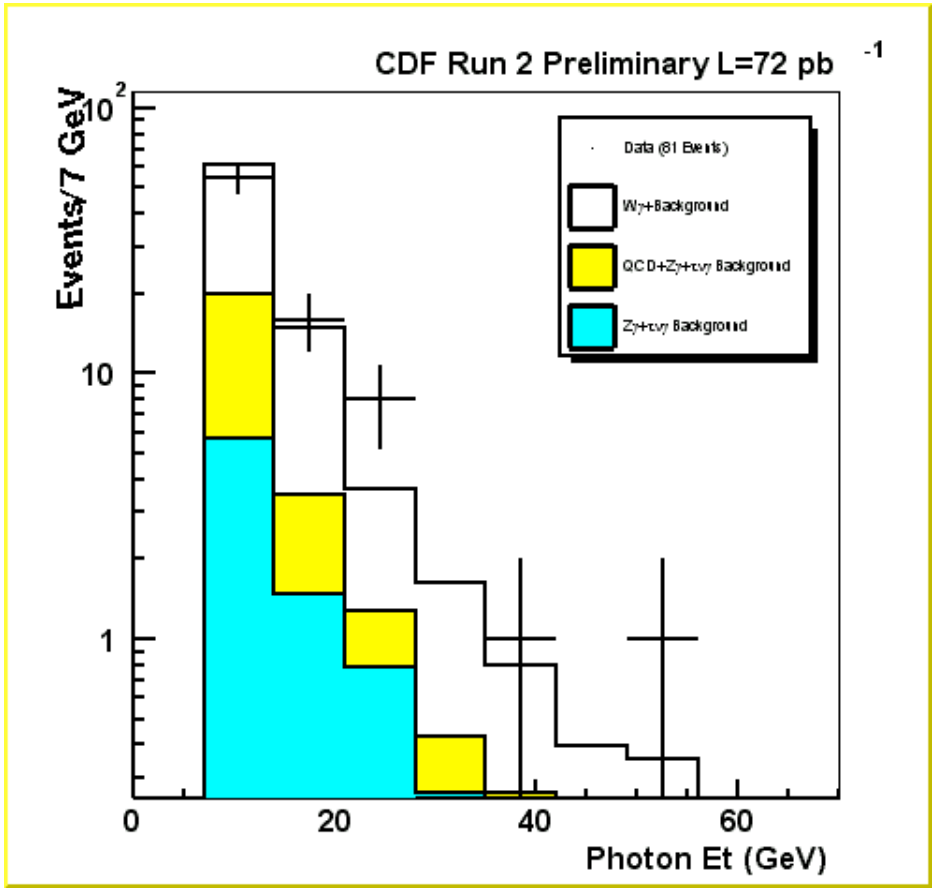


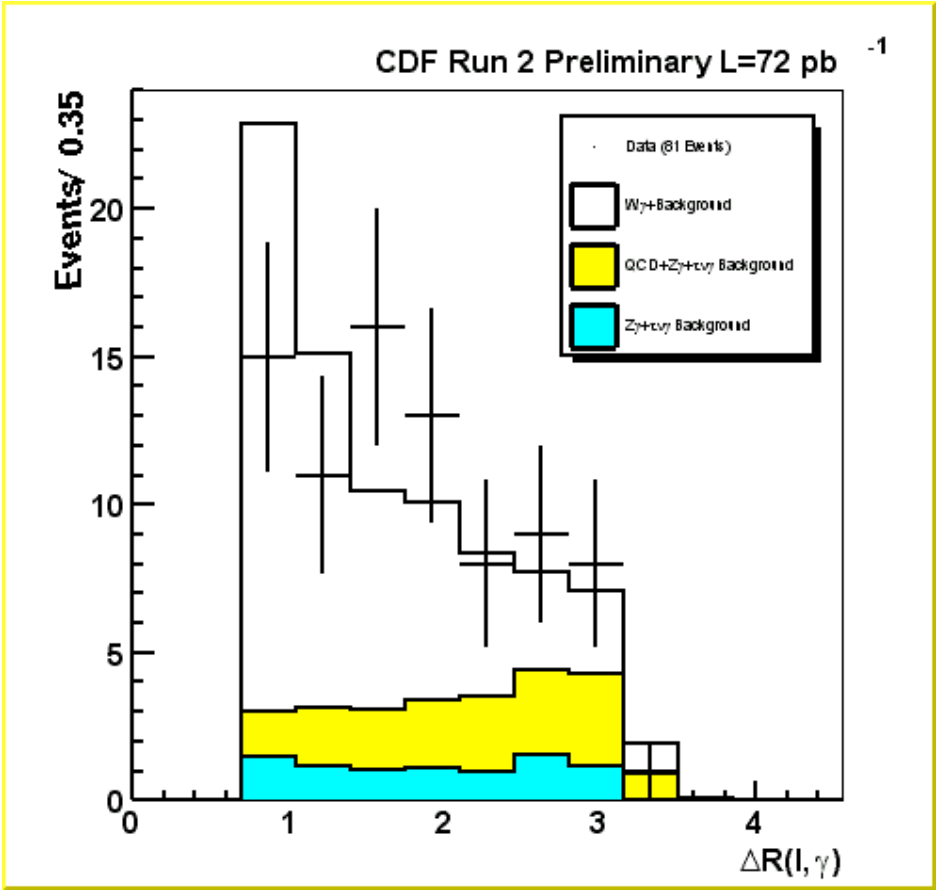


CTM vs Transverse Mass



Combined Elec & Muon Channel

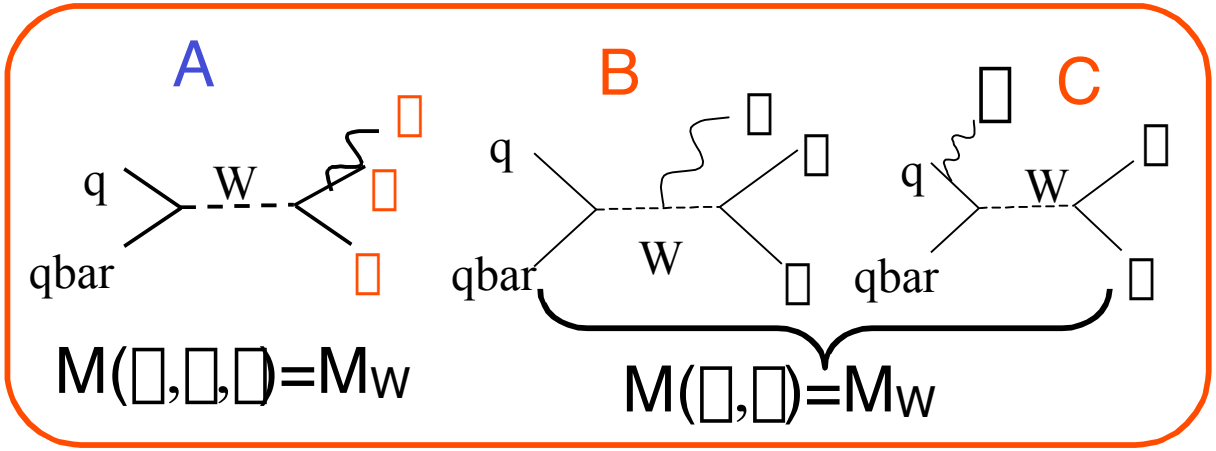




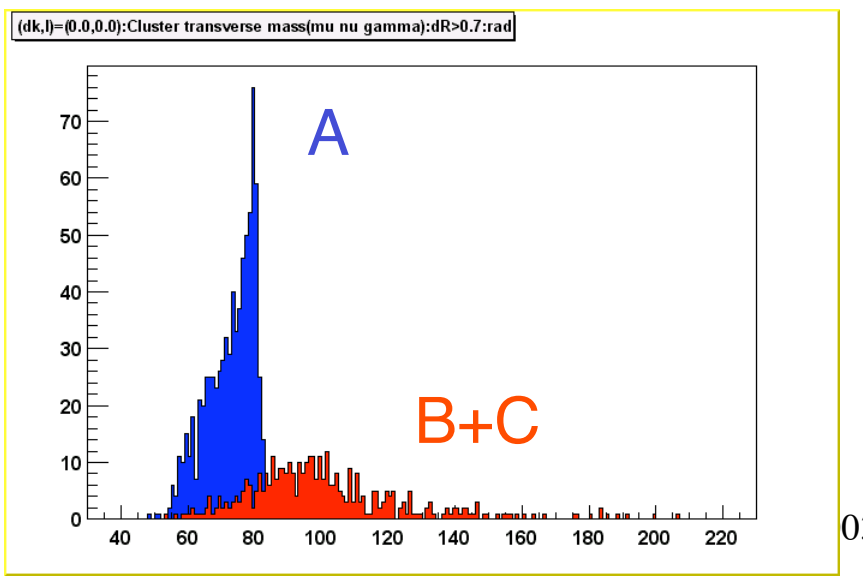
Conclusions

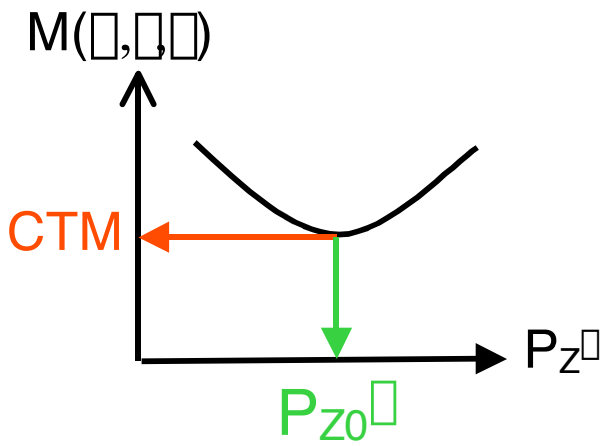
- Good agreement with Standard Model prediction in central detector measurement
- Electron channel measured 17.2 ± 4.7 pb
- SM prediction 18.7 ± 1.3 pb
- Kinematics match very well
- Outlook
  - Forward photons and electrons
  - Limits on anomalous couplings
  - More integrated luminosity

Cluster transverse mass



- dM(□,□,□)/dPz□=0 at Pz0□





Event Selection Details

Em Cluster Energy	> 25 GeV
Track Pt	> 10 GeV
Track $\lvert Z_0 \rvert$	< 60.0 cm
Track Quality	passed
Hadronic Energy Fraction	< 0.055 + 0.00045*E
Energy/Track P	< 2. or Pt > 50 GeV
Isolation Energy	< 0.1
Shower Max Cluster Quality Cut	passed
Lateral Shower Shape Distortion	< 0.2
Calorimeter Fiducial	passed
Missing Transnerse Energy	> 25 GeV

Variable	Cut
$\lvert \eta \rvert$	< 1.1
Et	> 7.0 GeV
Calorimeter Fiducial	passed
N3D Tracks	≤1, pt< 1+ 0.02*Et
Hadronic Fraction	0.055+0.00045*E
Calorimeter 0.4	Et <20: < 0.1*Et Et>20: < 2.0+0.005*Et
TrackIso0.4	< 5 GeV

Systematic uncertainty

- Luminosity 6%
- Electron reconstruction 1%
- Photon ID eff 4%
- Acceptance uncertainty 3%
- Electron Energy scale 1%
- Photon Energy scale 4%