R-Parity Violating Sneutrino Decay

Blessing

Kristian Hahn, Peter Wittich, Nigel Lockyer
University of Pennsylvania

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Systematics

- Bayesian routine takes uncertainties on 2 quantities ...
  - αL , N_{BG}
- Previous assumption of 15-20% on αL , N_{BG} was reasonable
  - Total $\sigma(\alpha L)$: 12.2%
  - Total $\sigma(N_{BG})$: 17.0%

Category	**Uncertainty (%)**
Acceptance	
MC Generation	9.7
PDF's	2.4
E & P Resolution	3.2
Lepton ID/Trig SF	1.6
Luminosity	6
N Background	
Luminosity	5.6
Fake Rates	16

Pdf's

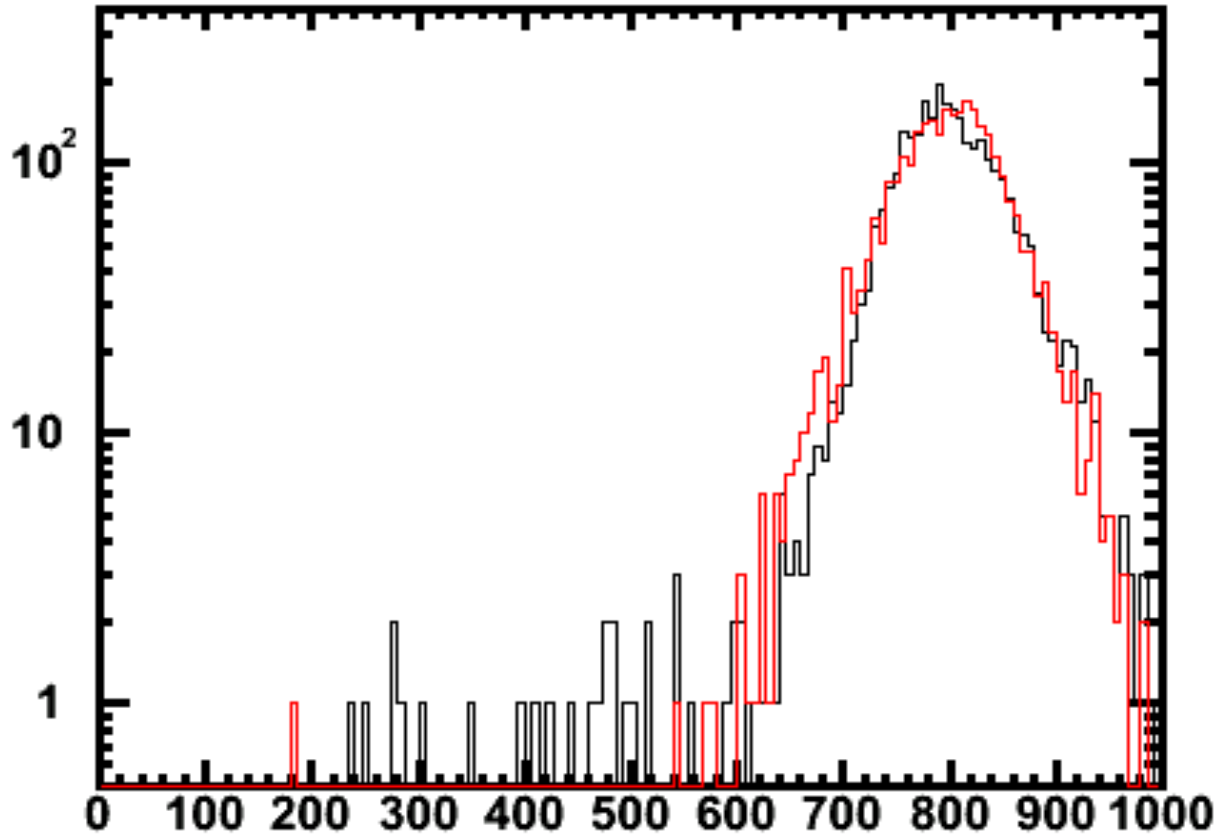
- Use S. Miller's pdf weighting code
  - See Joint Physics page for details
- Calculate acceptance scale factors for different pdf sets, no regeneration
  - Acceptance Ratio of MRST72 to CTEQ6L, etc.
  - Acceptance Ratio of 40 different CTEQ6L vectors
    - We use the largest up/down difference as the systematic
- Ran on 3 signal samples (200,400,800)
  - results are consistent.

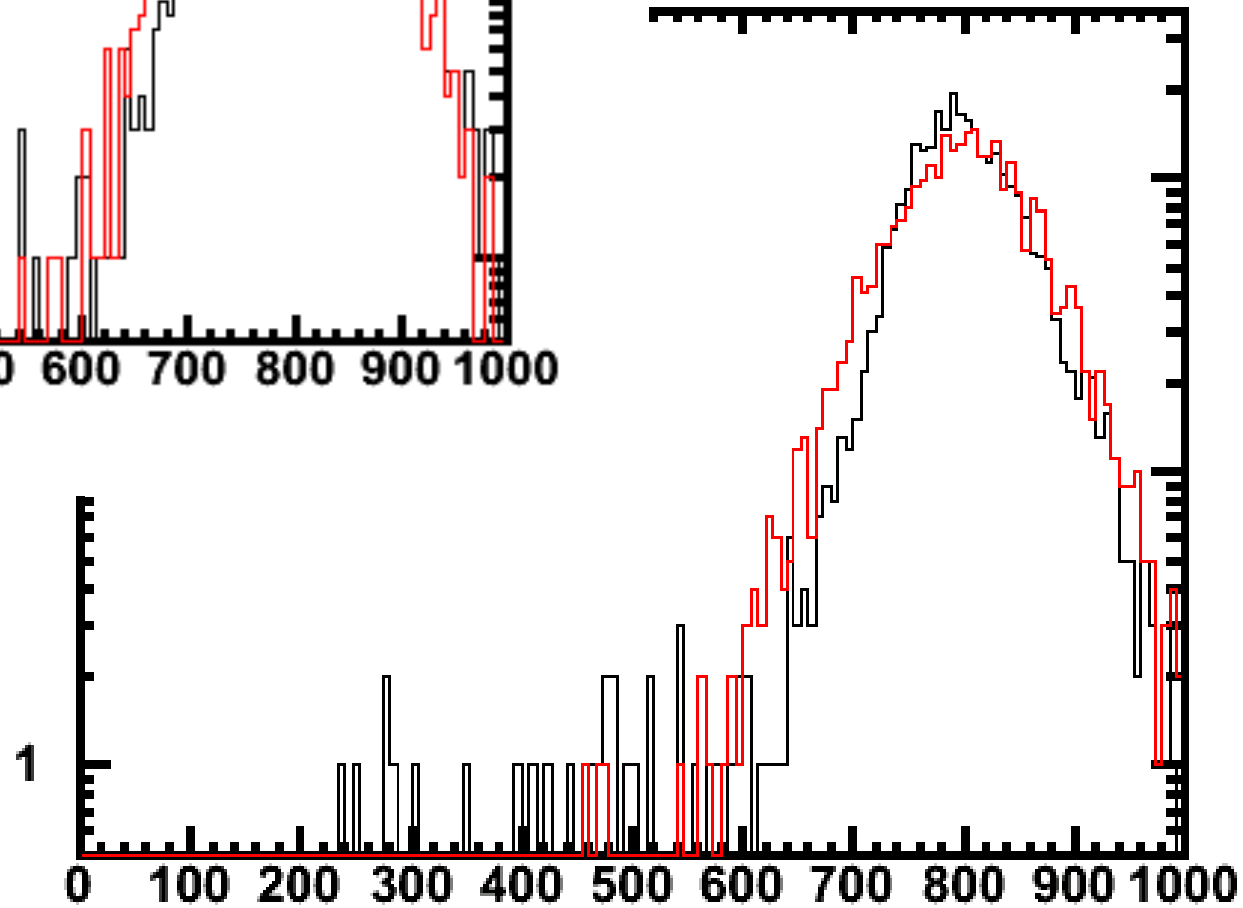
E & P : resolution

- Use the CEM and COT resolution functions to smear generator-level E & P.
  - Used dP/P = .0075%x P for momentum
    - Needed 0.15% 0.0075% to match reconstructed width
  - Used dE/E = 13.5%/sqrt(Et) + 2% for energy
    - Varied first term by 6%
- Degrade resolution by 1σ (scaled) and form inv mass
- Determine acceptance window from reconstructed signal MC and apply to smeared mass distribution
- Acceptance for the smeared distribution will be lower
- Take the difference as the systematic

- We're probably too conservative ...

mass


10^2
10
1
0 100 200 300 400 500 600 700 800 900 1000

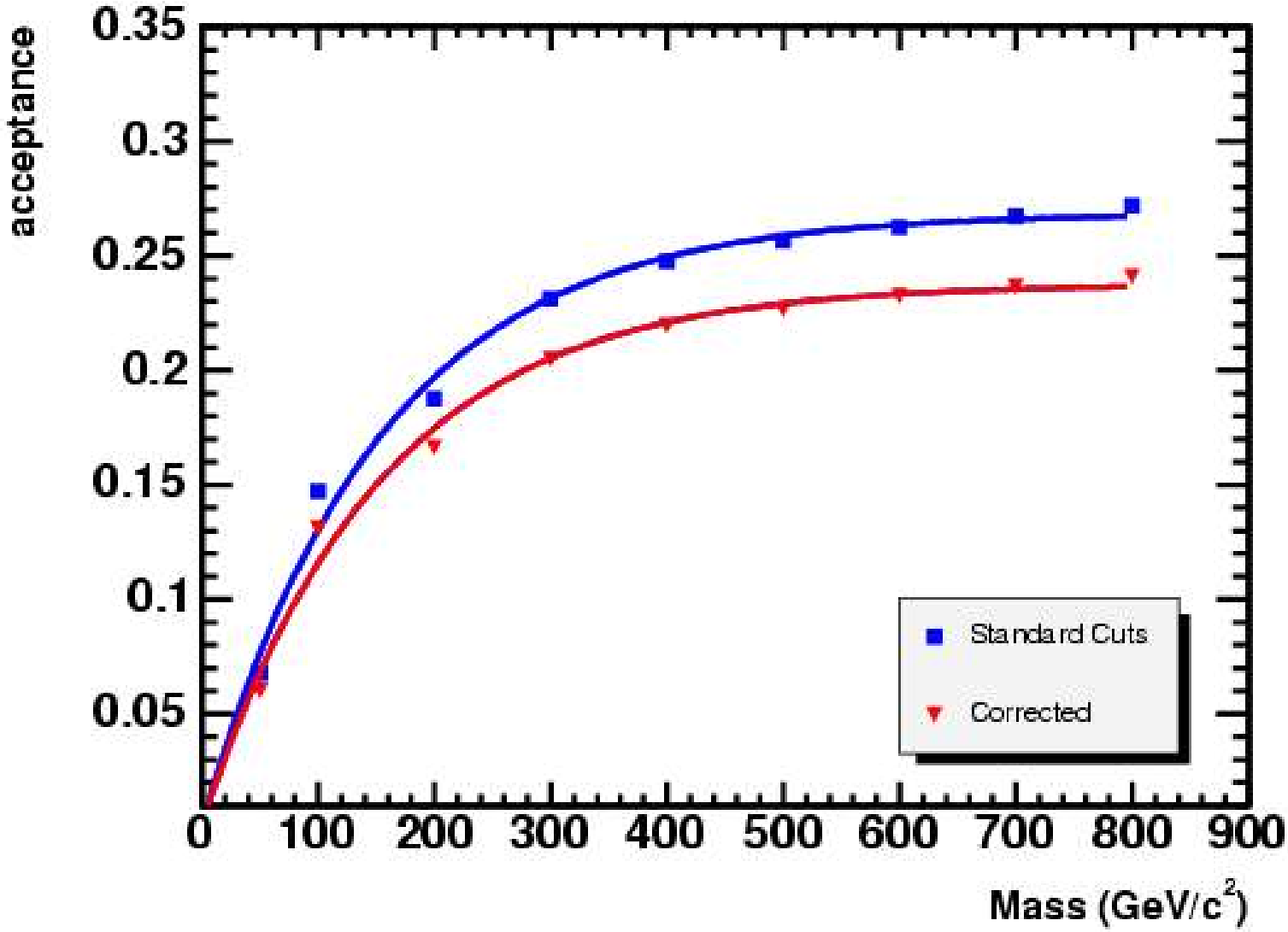

1
0 100 200 300 400 500 600 700 800 900 1000

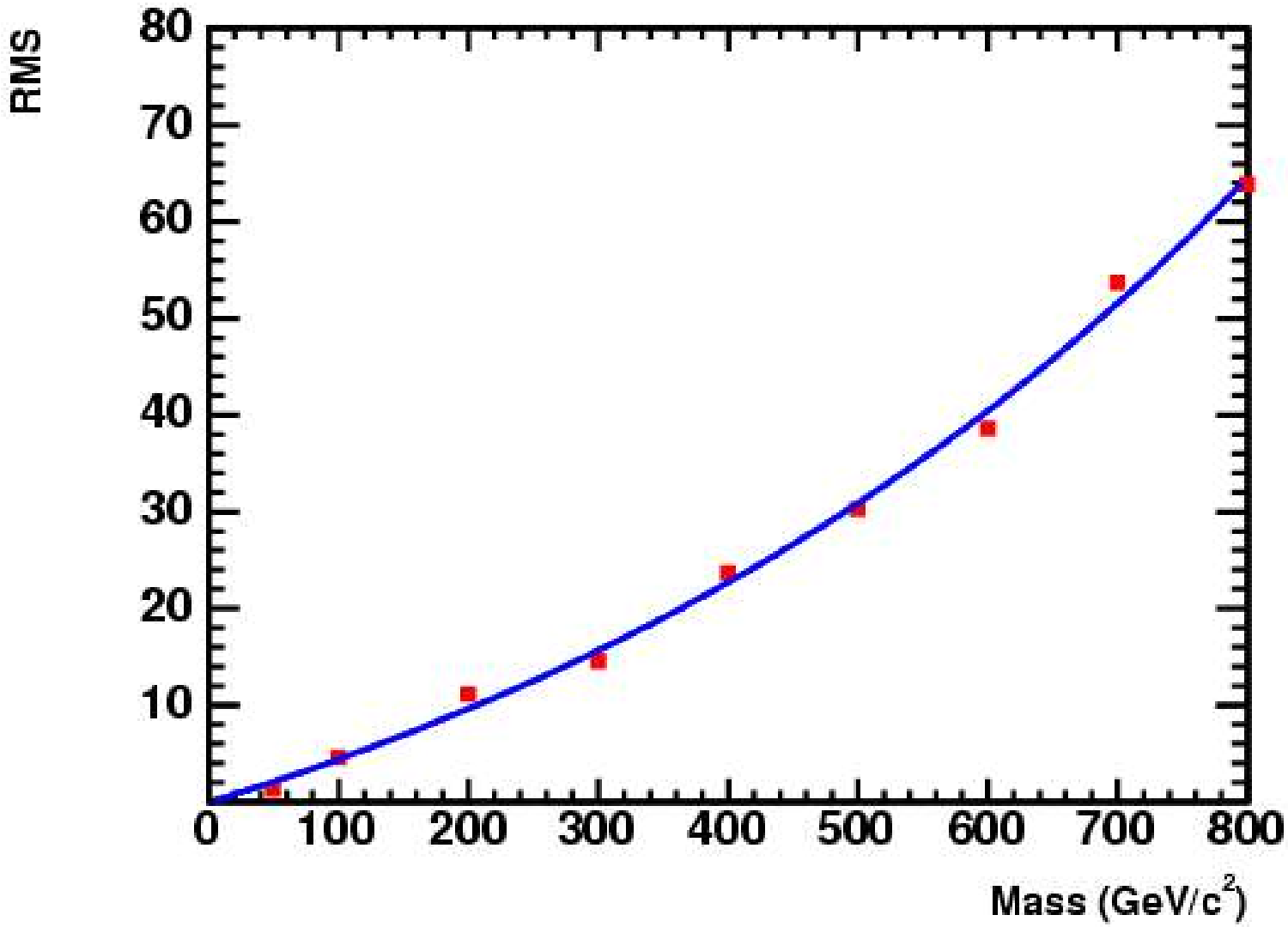
MC Generation

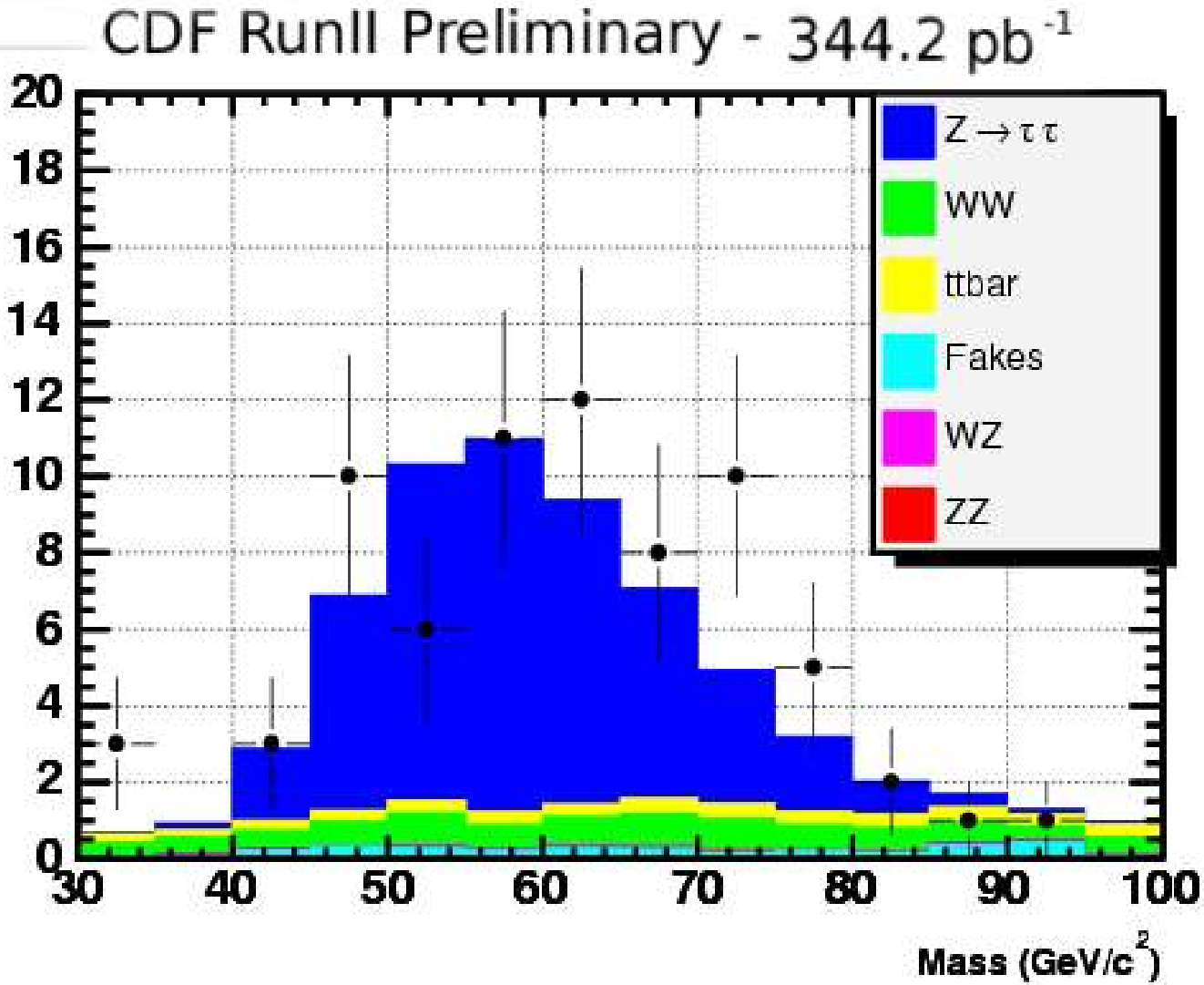
- Until now, spin-0 Higgs with Pythia
- Herwig has RPV SUSY, use to recalculate acceptance
  - lambda, lambda' only for ...
    - tau sneutrino production
    - e-mu final state
  - Set stau masses high for production from d dbar
- Use with top MC tarball, 5.3.3_nt as before

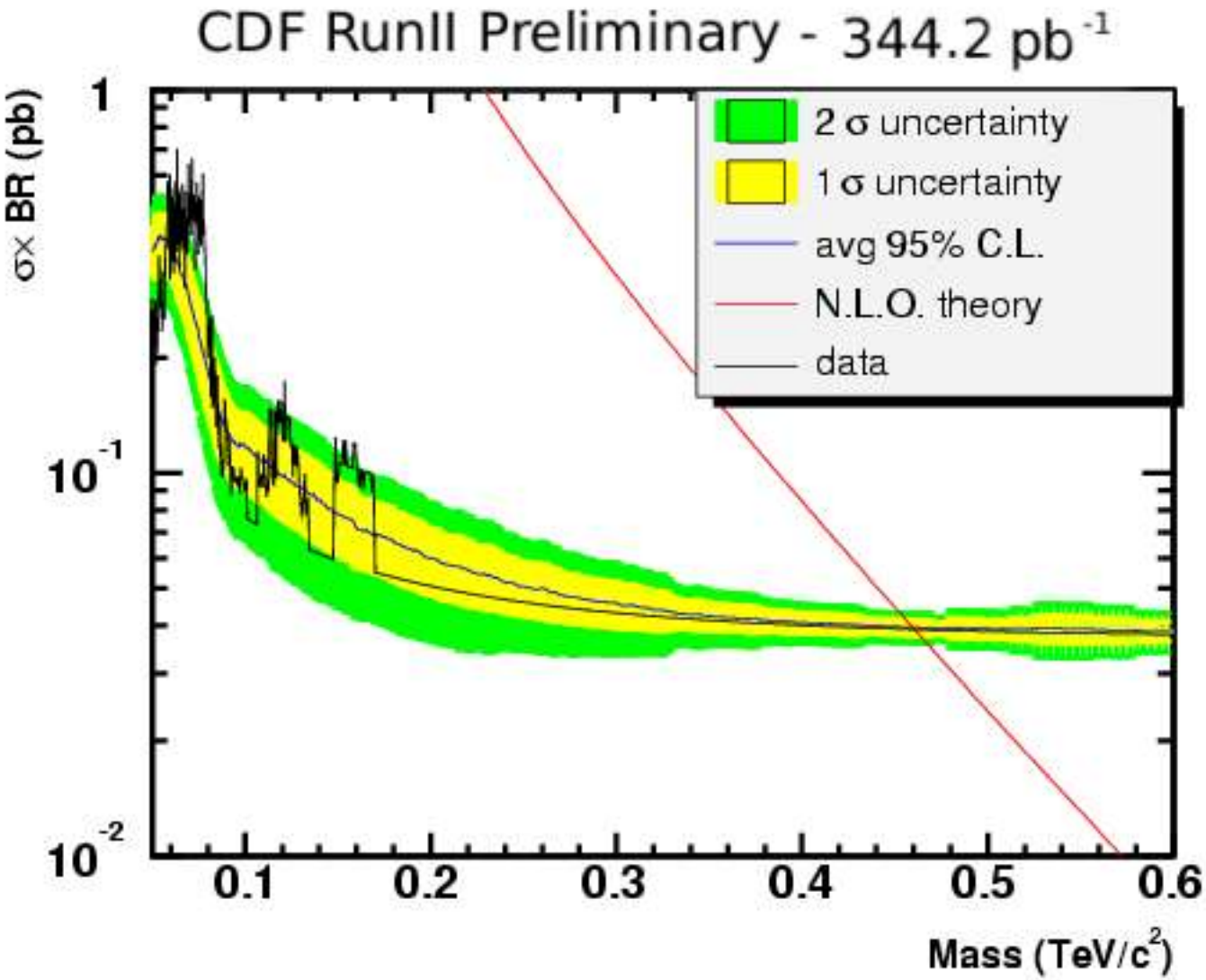
- CAF problems, not all sections finished. Take σ_{MC} from the 3 mass points whose jobs completed.

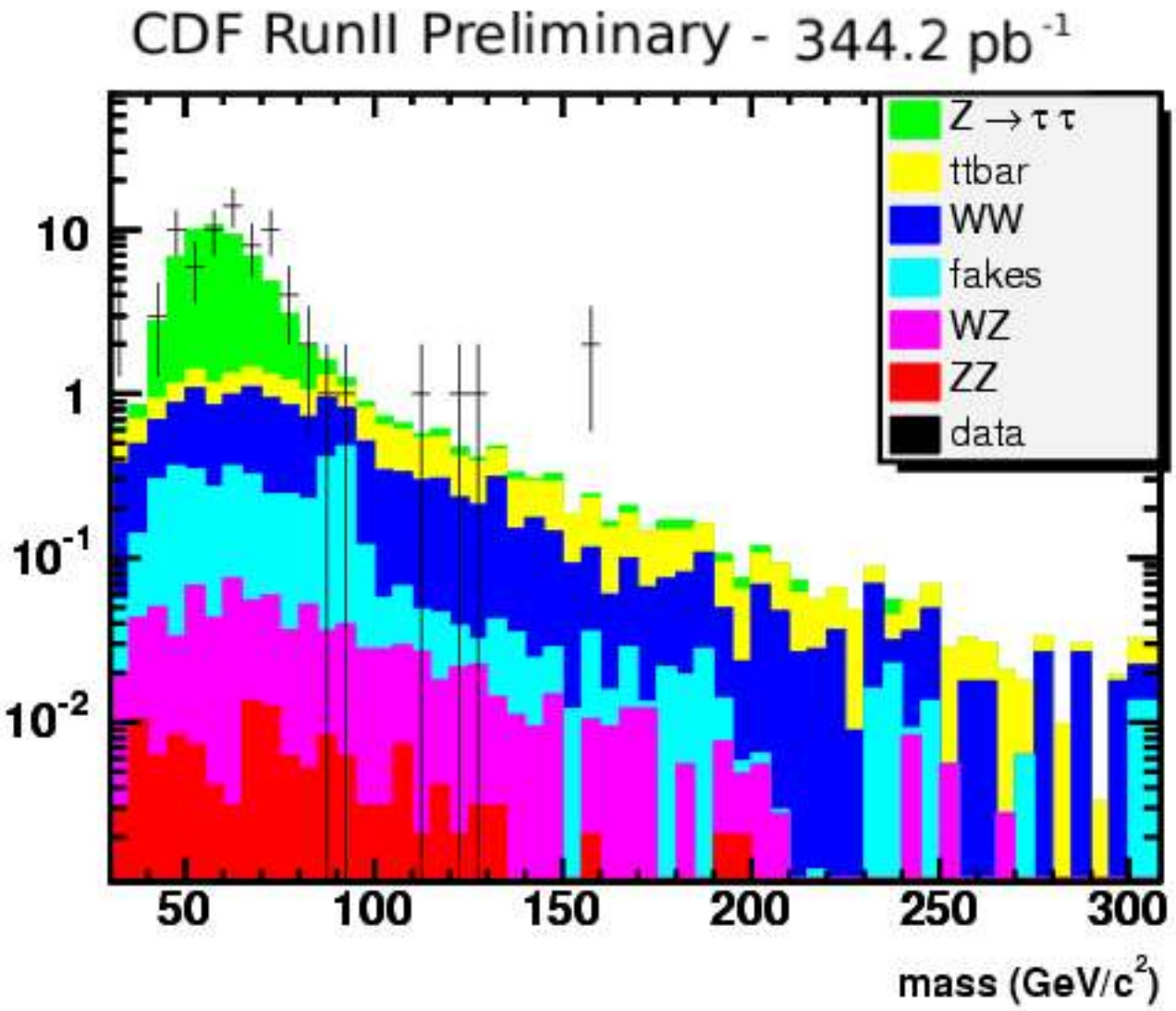
Plots and Tables for Blessing

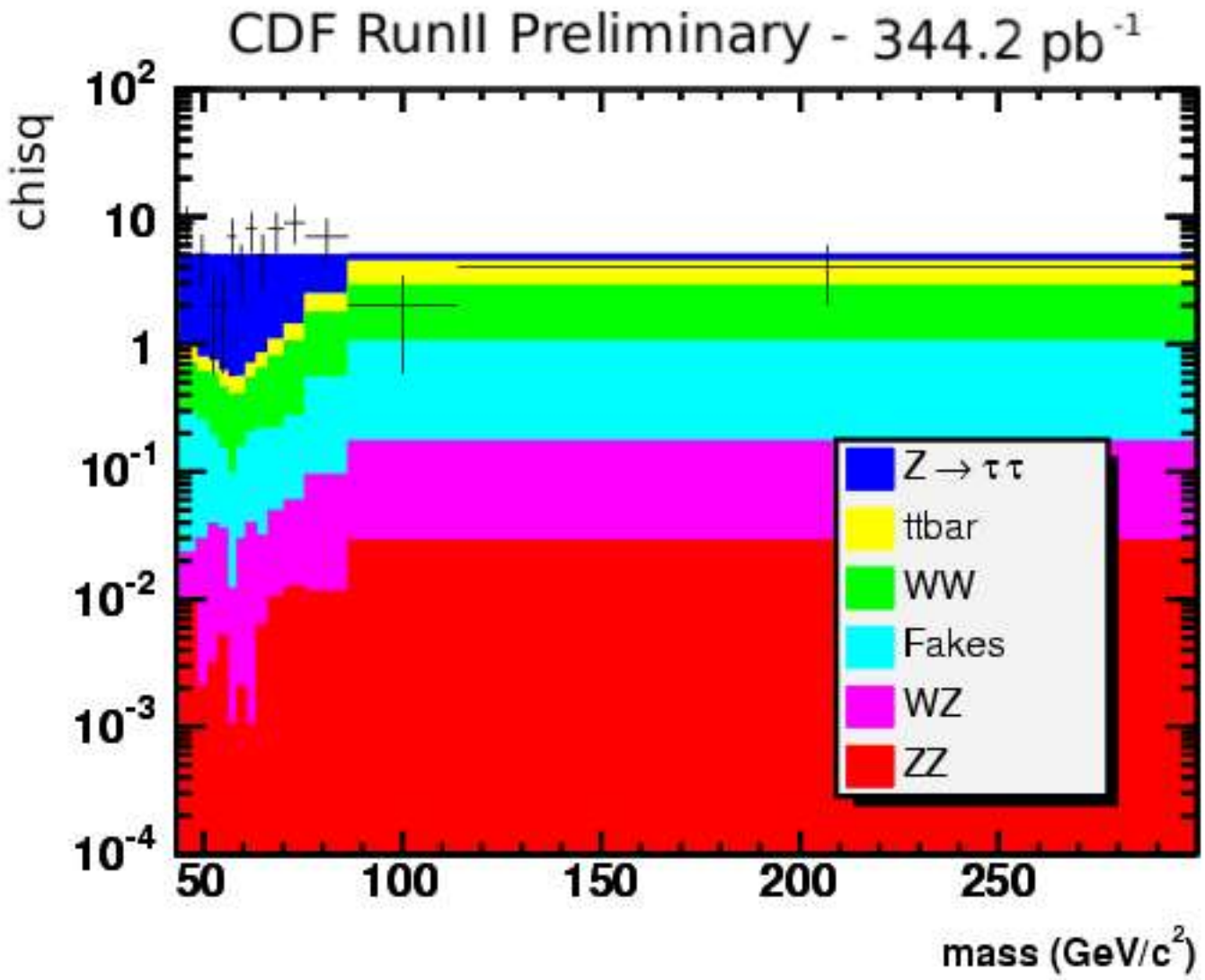

acceptance
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
100
200
300
400
500
600
700
800
900
Mass (GeV/c^2)
Standard Cuts
Corrected

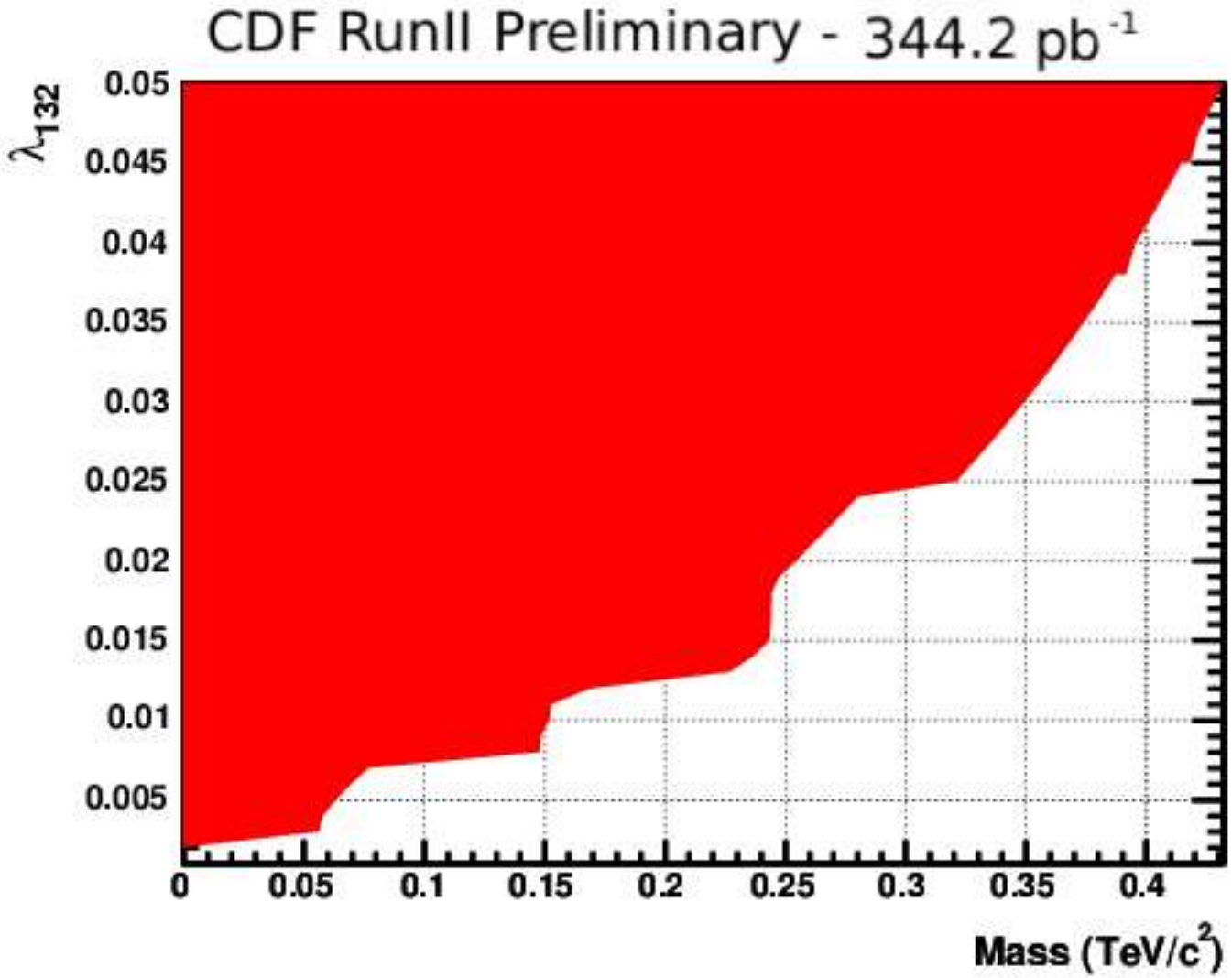

RMS
80
70
60
50
40
30
20
10
0
100
200
300
400
500
600
700
800
Mass (GeV/c^2)

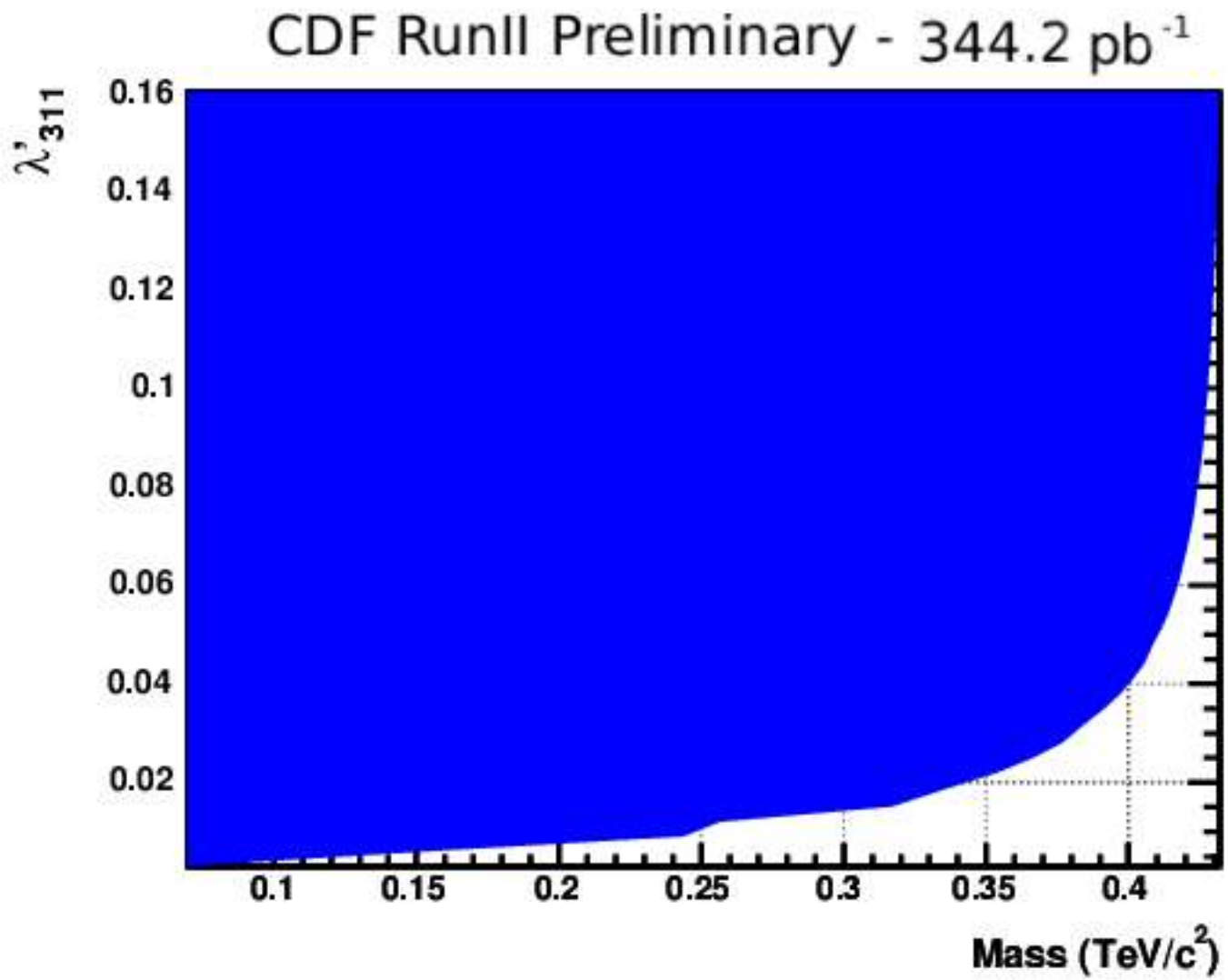

CDF RunII Preliminary - 344.2 pb^{-1}
$Z \to \tau\tau$
WW
ttbar
Fakes
WZ
ZZ
0
2
4
6
8
10
12
14
16
18
20
30
40
50
60
70
80
90
100
Mass (GeV/c^2)


CDF RunII Preliminary - 344.2 pb^{-1}
σ× BR (pb)
1
10^{-1}
10^{-2}
0.1
0.2
0.3
0.4
0.5
0.6
Mass (TeV/c^2)
2 σ uncertainty
1 σ uncertainty
avg 95% C.L.
N.L.O. theory
data


CDF RunII Preliminary - 344.2 pb^{-1}
$Z \rightarrow \tau\tau$
ttbar
WW
fakes
WZ
ZZ
data
10
1
10^{-1}
10^{-2}
50
100
150
200
250
300
mass (GeV/c^2)


CDF RunII Preliminary - 344.2 pb^{-1}
chisq
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
50
100
150
200
250
mass (GeV/c^2)
$Z \to \tau\tau$
ttbar
WW
Fakes
WZ
ZZ


CDF RunII Preliminary - 344.2 pb^{-1}
λ_{132}
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Mass (TeV/c^2)


CDF RunII Preliminary - 344.2 pb^{-1}
λ'_{311}
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Mass (TeV/c^2)

Channel	$N_{expected}$
$Z \to \tau\tau$	47.00 ± 0.76
$t\bar{t}$	7.78 ± 0.12
WW	11.38 ± 0.34
WZ	0.85 ± 0.05
ZZ	0.15 ± 0.01
Total : 71.30 ± 0.85	

Bin	Upper edge	Observed	χ^2
1	43.75	5	1.10E-06
2	48.15	9	3.128
3	51.25	5	0.002
4	53.7	2	1.816
5	56	2	1.829
6	58.4	7	0.791
7	60.7	4	0.213
8	63.45	8	1.763
9	66.35	5	5.41E-06
10	70.3	8	1.718
11	75.7	9	3.035
12	86.5	7	0.765
13	114	2	1.866
14	1000	4	0.561
total reduced χ^2			1.35
p value			0.231

Event : 1660363 Run : 178738 EventType : DATA | Unpresc: 0,32,1,33,34,3,35,4,8,40,41,10,11,12,13,45,14,15,47,48,17,18,19,20,21,22

Missing Et
Et=90.2 phi=1.7

List of Tracks

Id	pt	phi	eta

Cdf Tracks: first 5

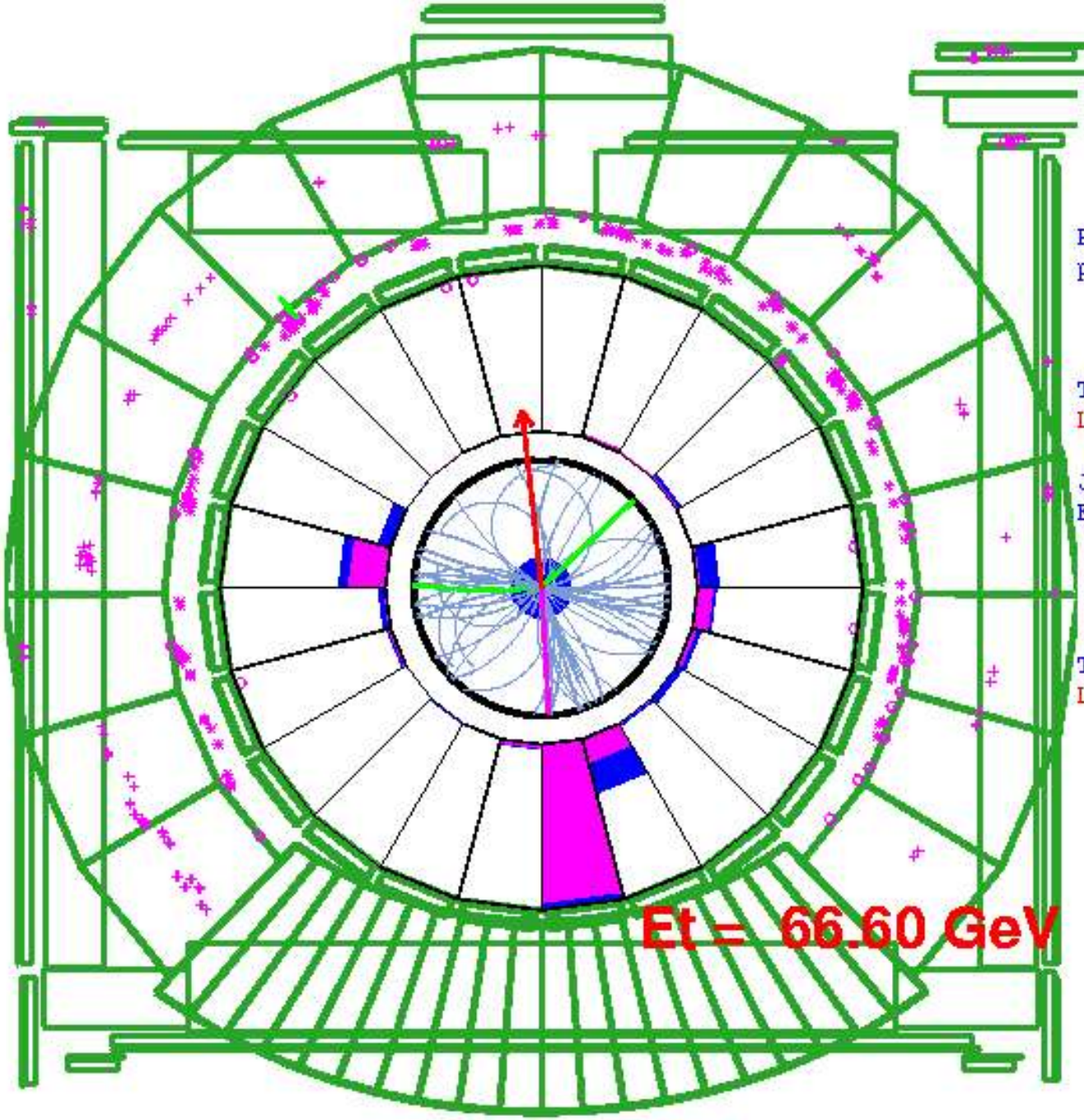
220	-102.4	0.8	0.2
221	59.0	-1.5	-0.6
265	21.8	-1.1	-2.3
266	18.2	1.0	-2.7
222	-14.2	-1.2	0.9

To select track type
SelectCdfTrack(Id)

Svt Tracks: first 5

3	6.5	3.9
0	-5.7	0.8
1	-3.8	0.0
2	1.4	1.3

To select track type
SelectSvtTrack(Id)



Particles: first 5

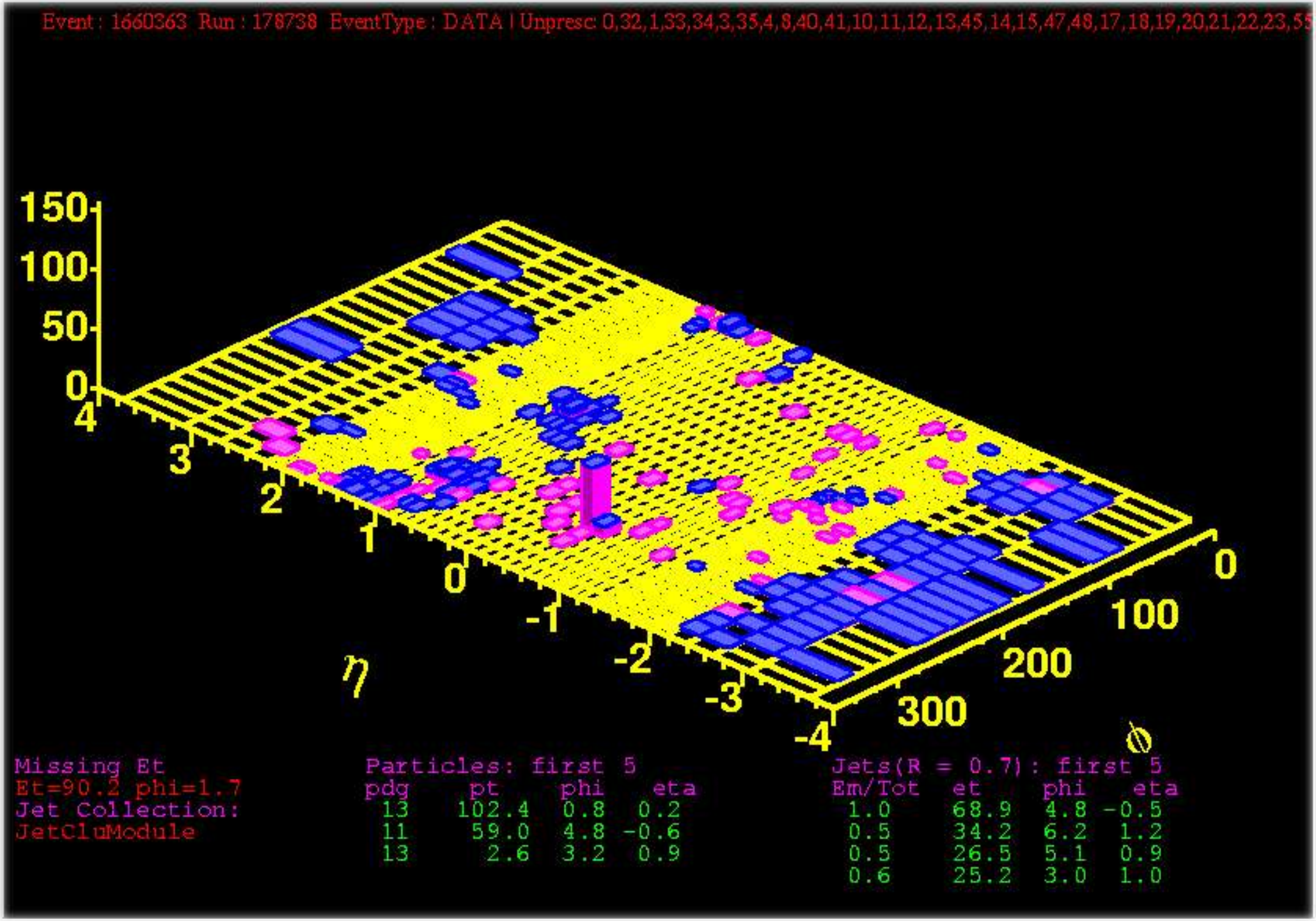
pdg	pt	phi	eta
13	102.4	0.8	0.2
11	59.0	4.8	-0.6
13	2.6	3.2	0.9

To list all particles
ListCdfParticles()

Jets(R = 0.7): first

Em/Tot	et	phi	et
1.0	68.9	4.8	-0.
0.5	34.2	6.2	1.
0.5	26.5	5.1	0.
0.6	25.2	3.0	1.

To list all jets
ListCdfJets()


Event : 1660363 Run : 178738 EventType : DATA | Unpresc: 0,32,1,33,34,3,35,4,8,40,41,10,11,12,13,45,14,15,47,48,17,18,19,20,21,22,23,55
150
100
50
0
4
3
2
1
0
-1
-2
-3
-4
η
0
100
200
300
φ
Missing Et
Et=90.2 phi=1.7
Jet Collection:
JetCluModule
Particles: first 5
pdg pt phi eta
13 102.4 0.8 0.2
11 59.0 4.8 -0.6
13 2.6 3.2 0.9
Jets(R = 0.7): first 5
Em/Tot et phi eta
1.0 68.9 4.8 -0.5
0.5 34.2 6.2 1.2
0.5 26.5 5.1 0.9
0.6 25.2 3.0 1.0