# UED Update

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- Motivation
- Opposite Sign dimuons
- First data studies
- Next steps

# Motivation

- First procedures for muons
  - Accumulated luminosity
  - Clean up procedures for muons
  - Which muons to use
- Background at first data?
- Increase signal efficiency at some level?

# Opposite Sign Dimuons

- Similar procedure for J/Psi reconstruction
- GOODCOLL data (v7+v8+v9): ~82M events
- Pairs of global-global or global-tracker muons
- All muon tracks:
  - Pixel layers with hits > 1
  - Number of pixel+strip hits > 11
  - |d0| < 5 cm, |dz| < 20 cm
- Global muons:
  - global $\chi^2 < 20$
- Tracker muons:
  - track $\chi^2 < 5$
  - TMLastStationAngTight bit on
- Vertex probability > 0.1%

# Opposite Sign Dimuons

**PDG:**

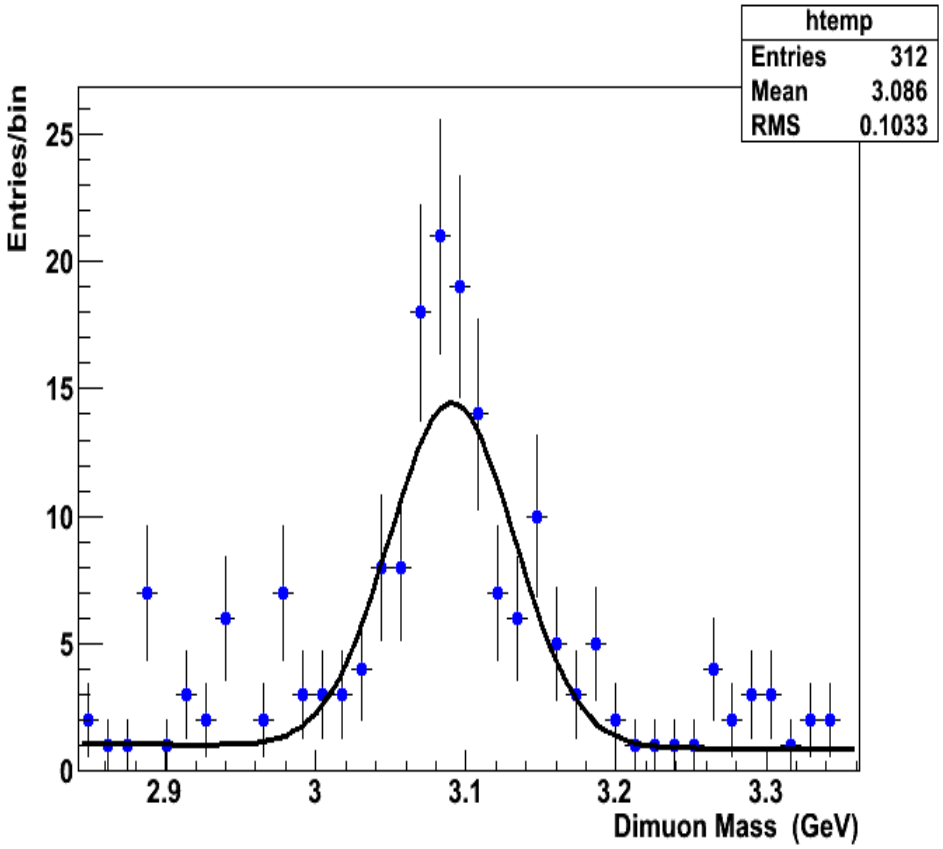
**$M_{J/\psi}$ = 3096.916±0.011 MeV**

**Fit:**

**$M_{J/\psi}$ = 3090.8± 4.8 MeV**

**Resolution $\sigma_{J/\psi}$ = 42 ±6.5 MeV**

**$N_{signal}$ =103 ± 22 evts**




Exponencial + Gaussiana

"[0]*exp([1]*x)+[2]*exp(-0.5*pow((x-[3])/[4],2))"

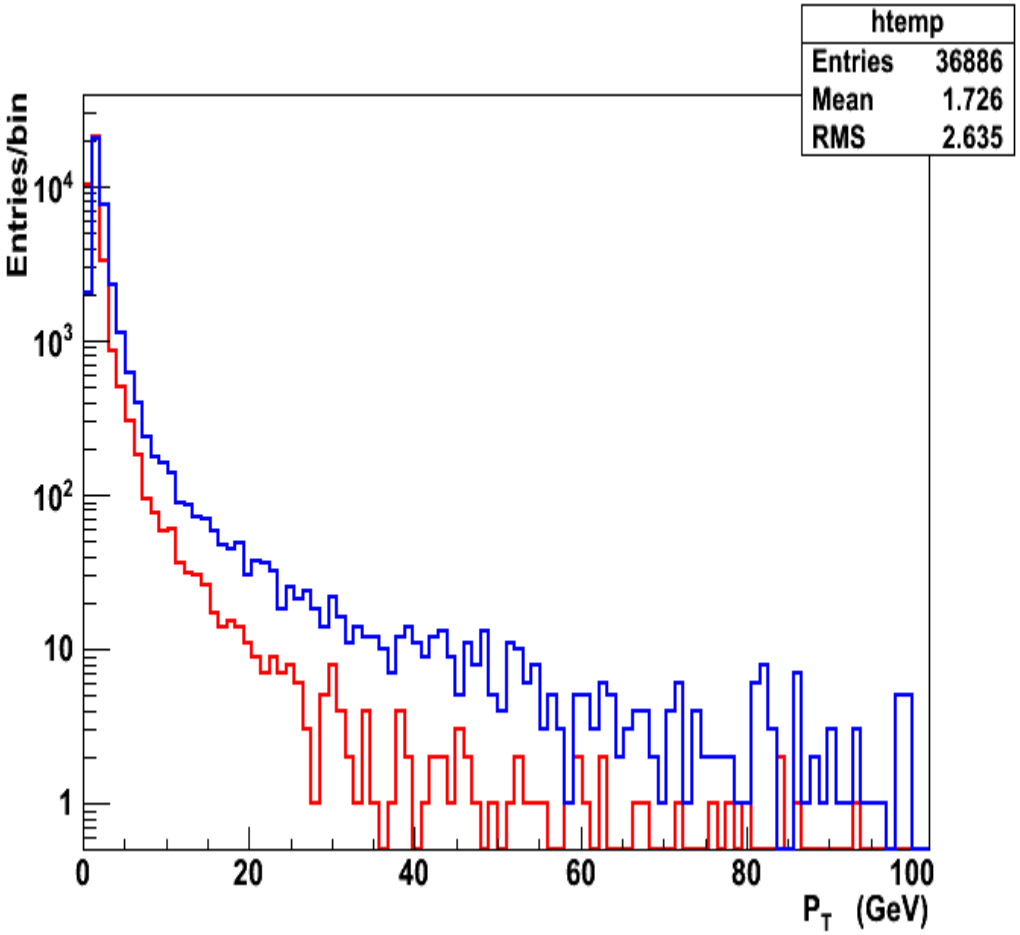
| | Value | Error |
|---|---|---|
| p0 | 3.72980e+00 | 6.03857e-02 |
| p1 | -4.35415e-01 | 5.63535e-03 |
| p2 | 1.34745e+01 | 2.20021e+00 |
| p3 | 3.09081e+00 | 4.79717e-03 |
| p4 | 4.16876e-02 | 6.48729e-03 |

# First Data Analysis

- GOODCOLL (v7+v8) ~ $0.14nb^{-1}$
- Minimum bias data
- Background rejection: Naïve test of selection cuts
- Identify best muon setup for analysis
  - Start as loose as possible
  - Required only 1 SS dimuon
  - No muon clean up

# First Data Analysis

- Total of 36905 SS dimuons.
- Includes standalone, tracker and global muons
- Transverse momentum similar to signal
  - More for the next to leading muon
- Apply selection cuts to first evaluate background



# First Data Analysis

Signal selection efficiency high:

For 100 $pb^{-1}$:

$N_{sel}/N_{reco}$ = 46% $\rightarrow$ 247 events

Background rejection:

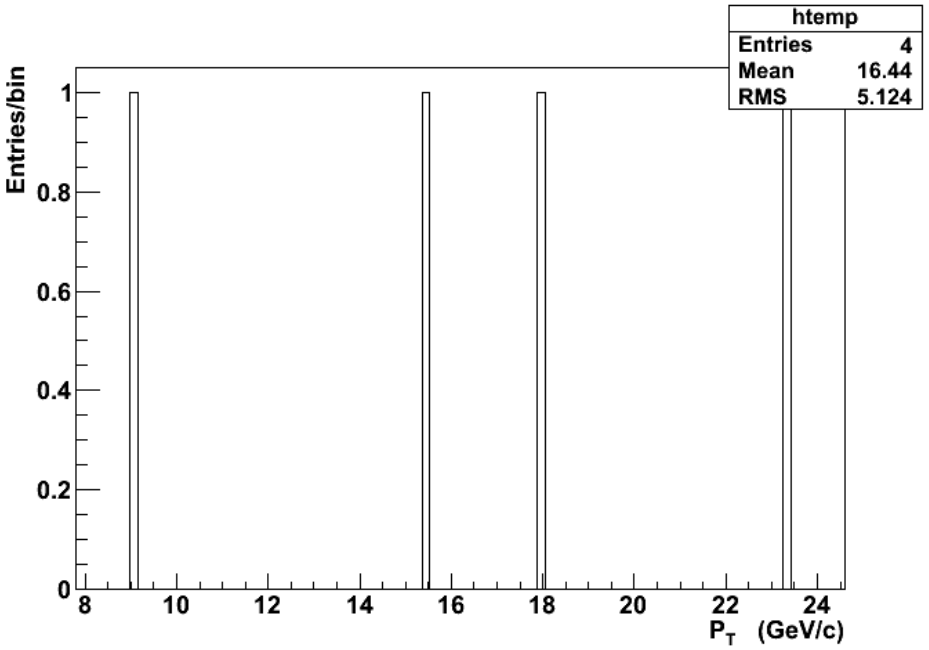
ttbar: 2.5±0.3

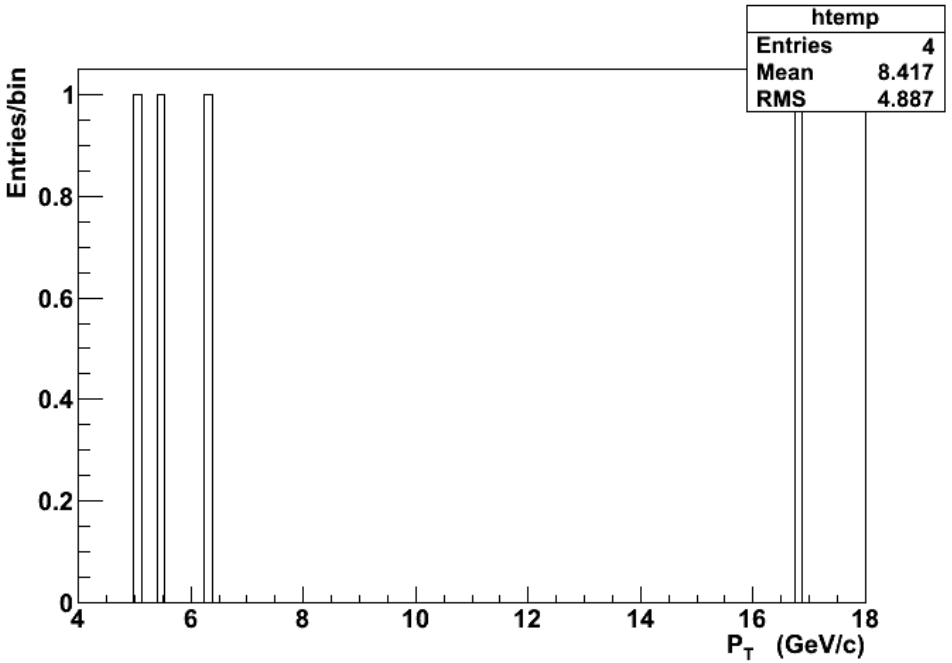
Z+jets: [0.06:0.7] CL=90%

| Variable | Cut |
|---|---|
| Leading μ: $p_T$ | > 7.0 GeV, < 35.0 GeV |
| Leading μ: track $p_T$ sum (ΔR=0.5) | < 6.0 GeV |
| Leading μ: min ΔR (μ, jets) | > 0.2 |
| Next μ: $p_T$ | > 5.0 GeV |
| Next μ: track $p_T$ sum (ΔR=0.5) | < 8.0 GeV |
| Next μ: min ΔR (μ, jets) | > 0.3 |
| Dimuon: vertex $\chi^2$/ndof | < 4.0 |
| Jets: n jets ($p_T$>25.0 GeV) | > 1 |

**Four real minimum bias events passed**

# First Data Analysis

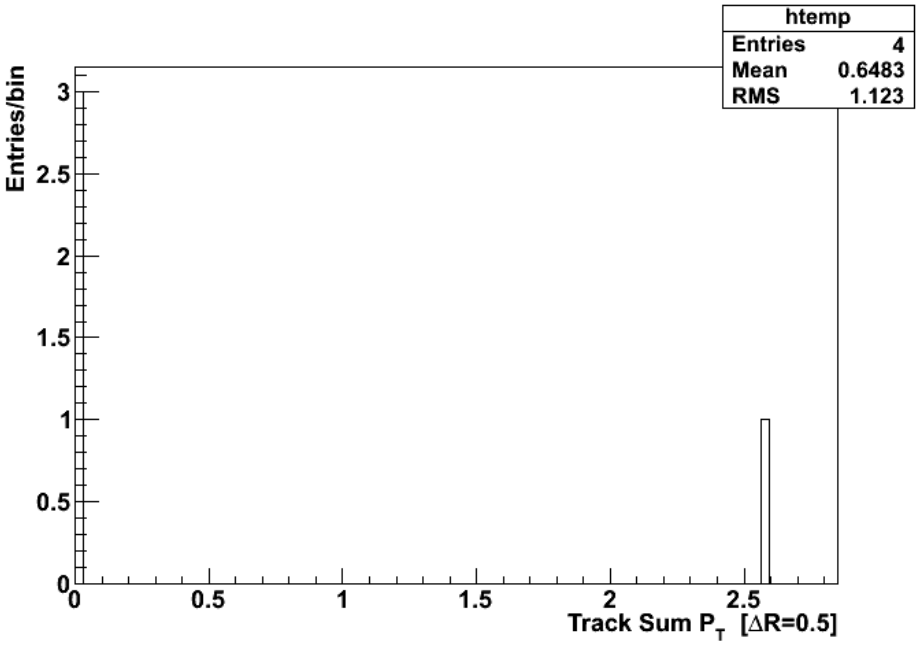


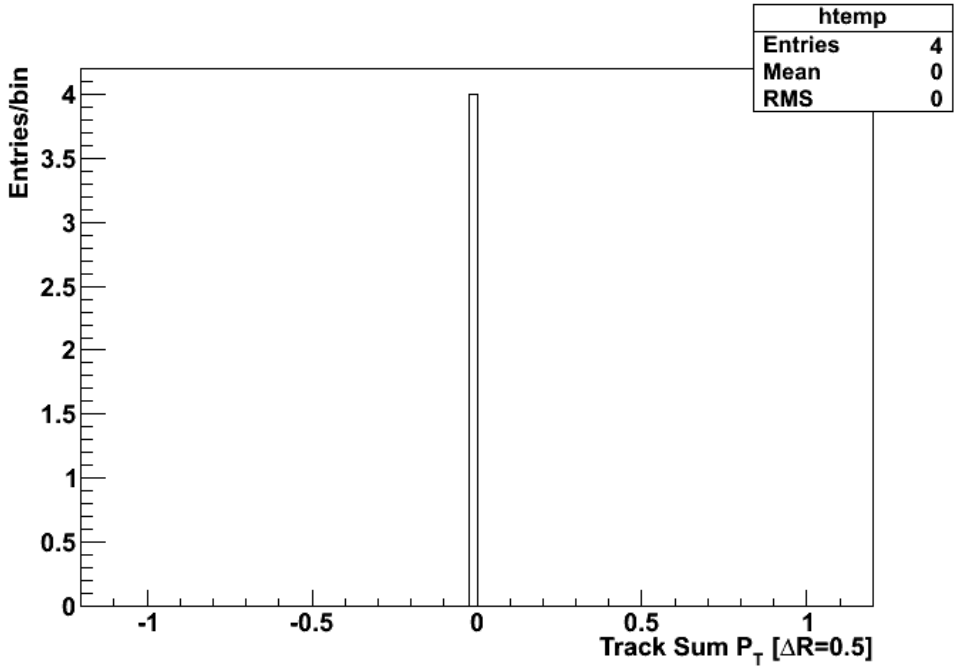




**Entries well above $P_T$ cuts**

**Tight this cuts may not be solution in the long term too**

# First Data Analysis

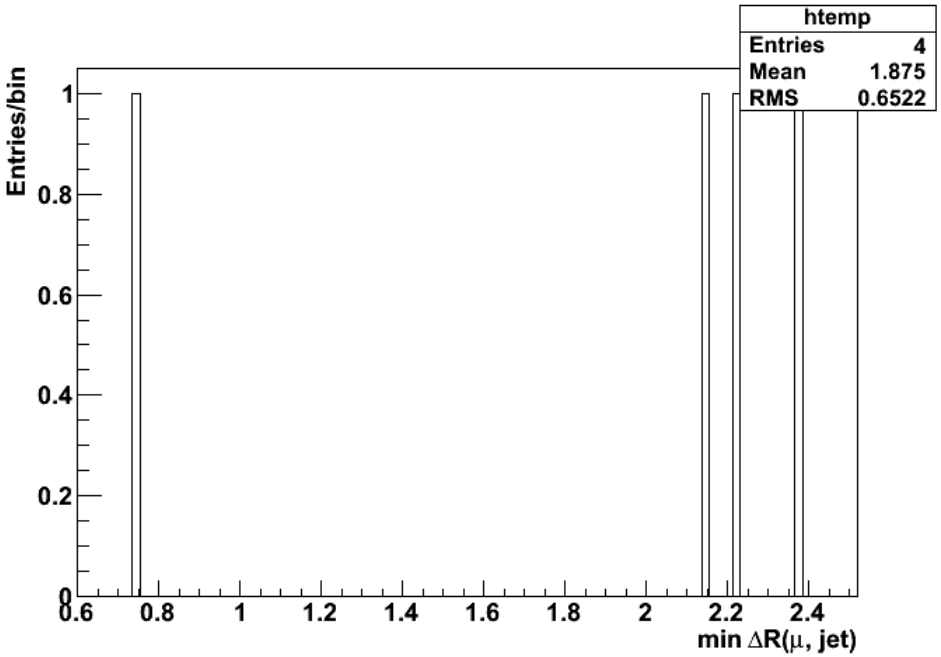


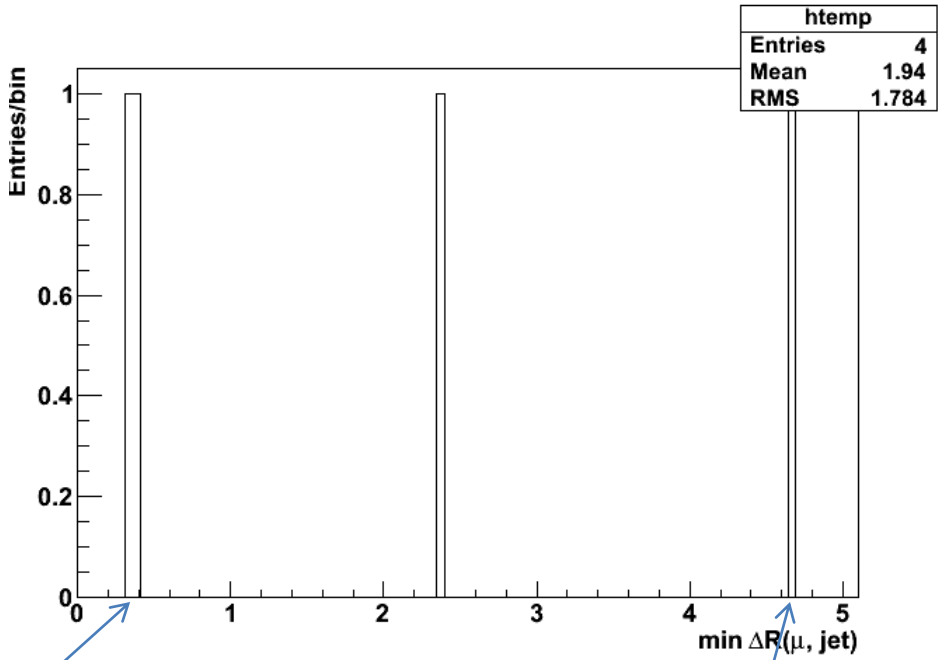




**Both tracks seem to be isolated**

**Very tight cut can drastically reduce background**

# First Data Analysis

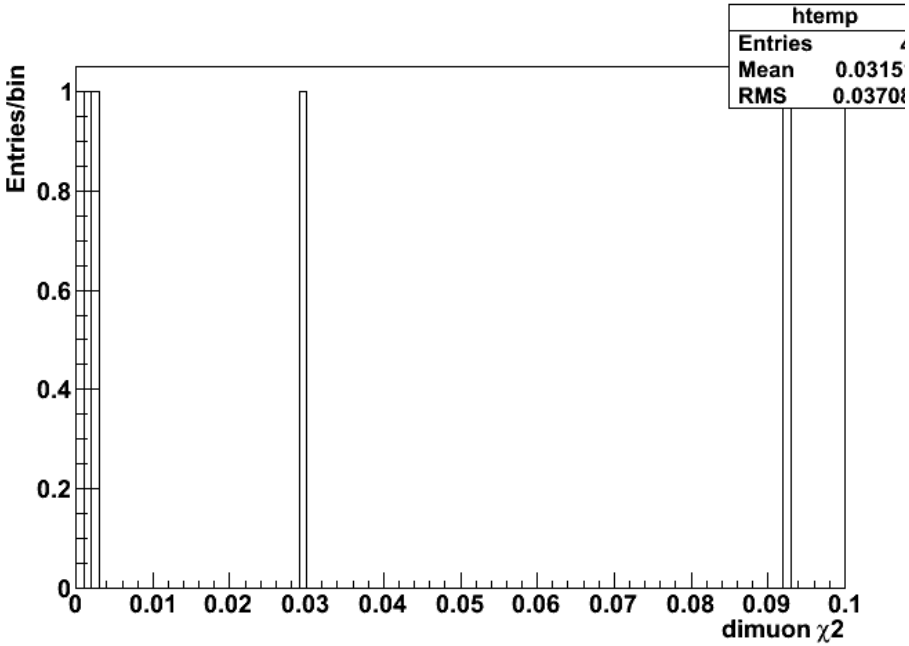


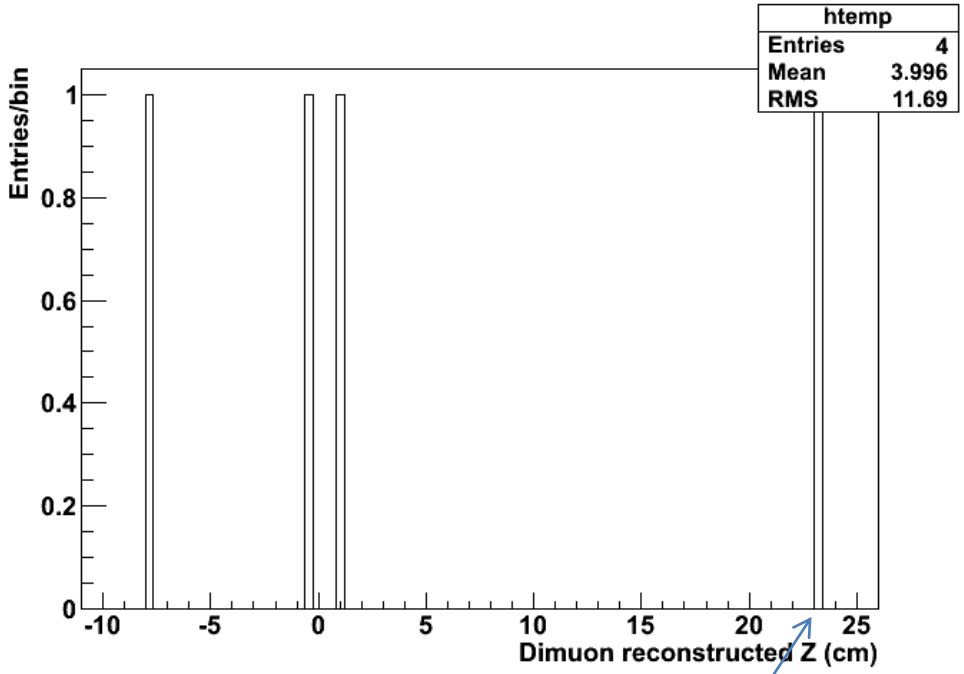




**Very close to cut**
**Signal reduction almost negligible**

**No signal region**

# First Data Analysis



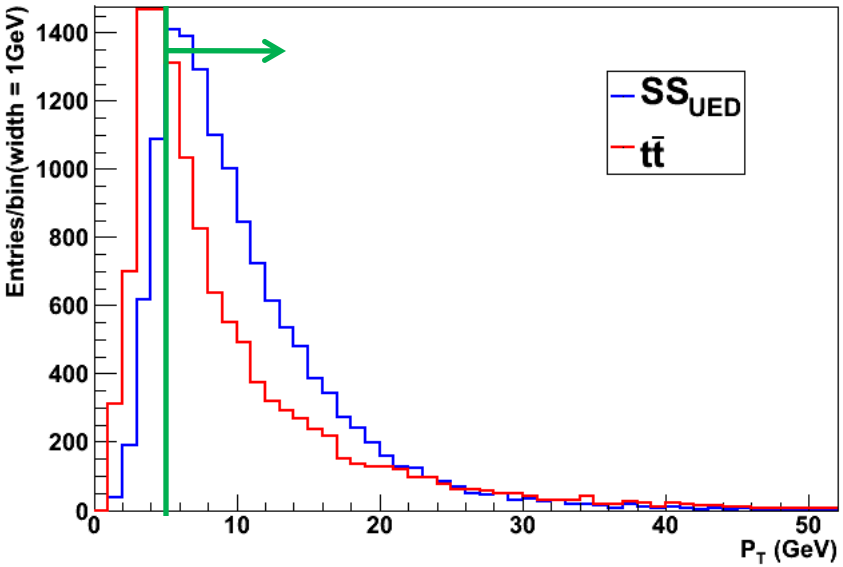

**Far off signal distribution**
**However good $\chi^2$**

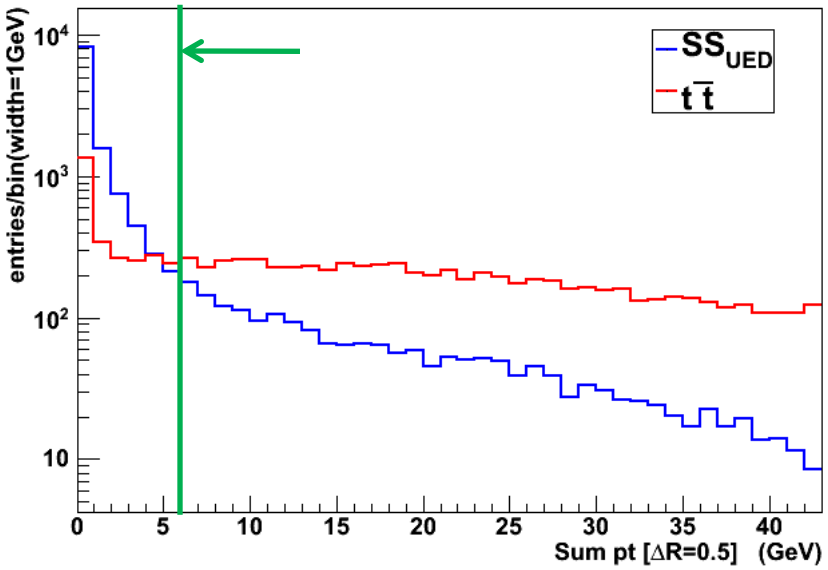
# Summary

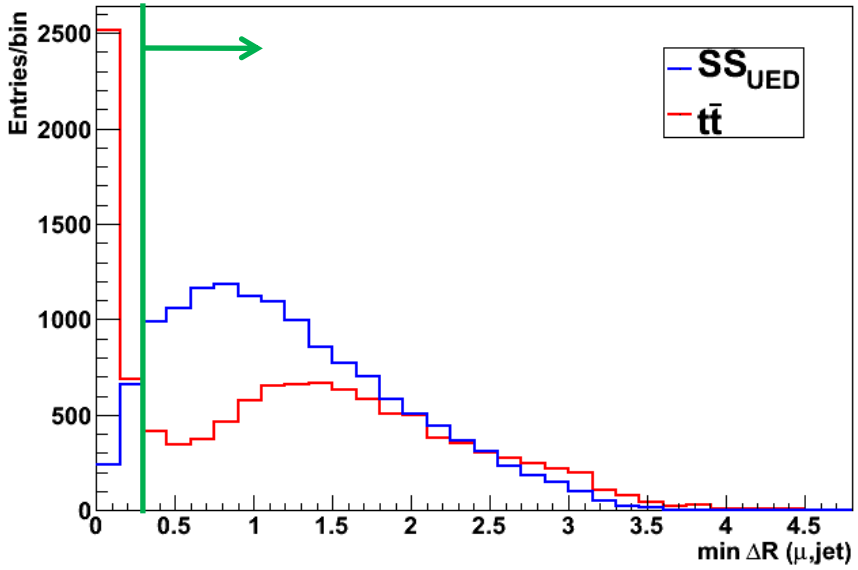
- It may be possible to relax muons requirements
  - Tracker + Global instead of just Global
  - Signal improvement can be a bonus
- Apply muon cleanup and see if these events still pass
- Background studies should keep going as lumi increases
- Need to get a good trigger path.
  - Suggested quarkonia's path
- Next is to run on minimum bias MC to cross-check simulation and rerun on signal
- Should run on other MC samples too

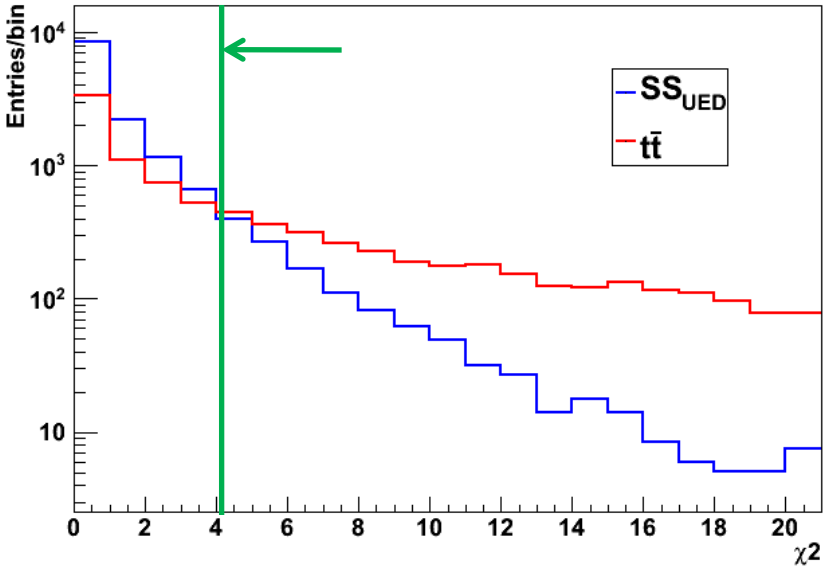
# Backup Slide

# Cuts on signal and ttbar events




**Cuts based on ttbar distributions**