W mass combination discussion
CDF smearing tuning and validation

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LHC & Tevatron combination meeting
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Overview

Smearing functions uploaded to git and described in January 11 meeting

Tuning histograms

- Z mass: electron scale and resolution parameters
- Z p_T: Pythia tune
- Z p_T-recoil balance: recoil response
- Z p_T-recoil balance spread: recoil resolution

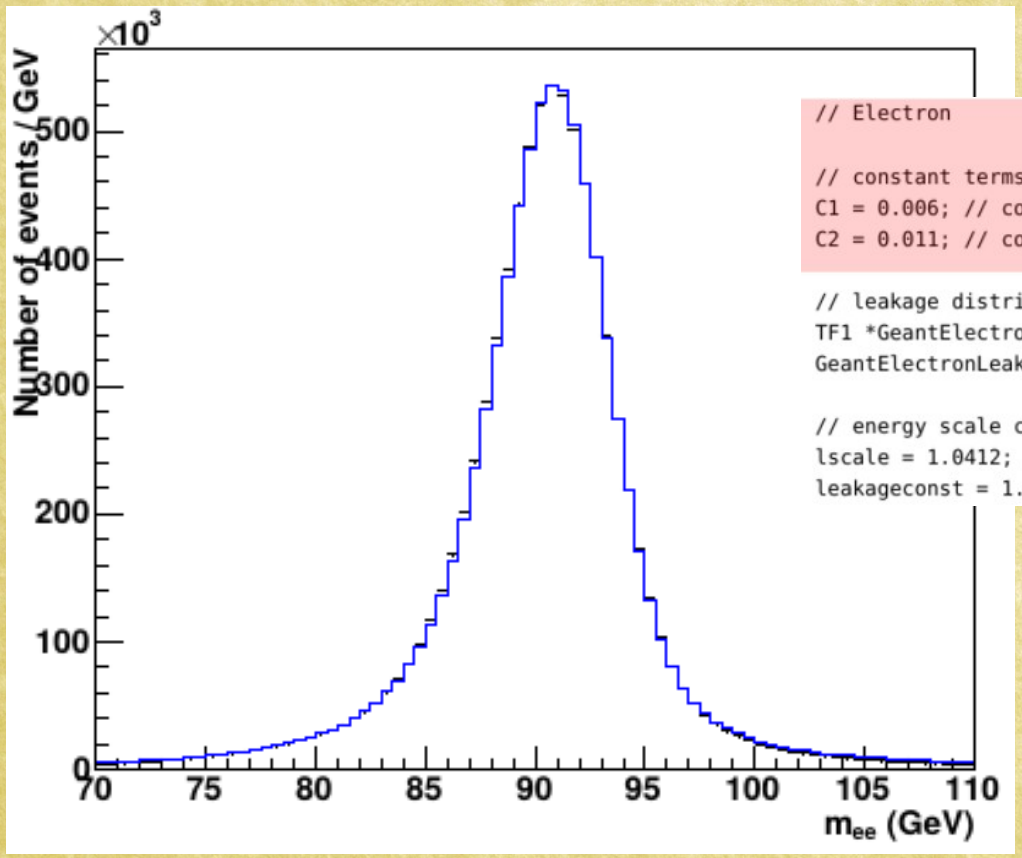
Validation histograms

- W $u_{\parallel}$
- W $u_{\perp}$
- W m_T
- W p_T(e)
- W p_T(ν)

Electron scale and resolution

Adjusted scale to better match simulation

1.0412 changed to 1.038

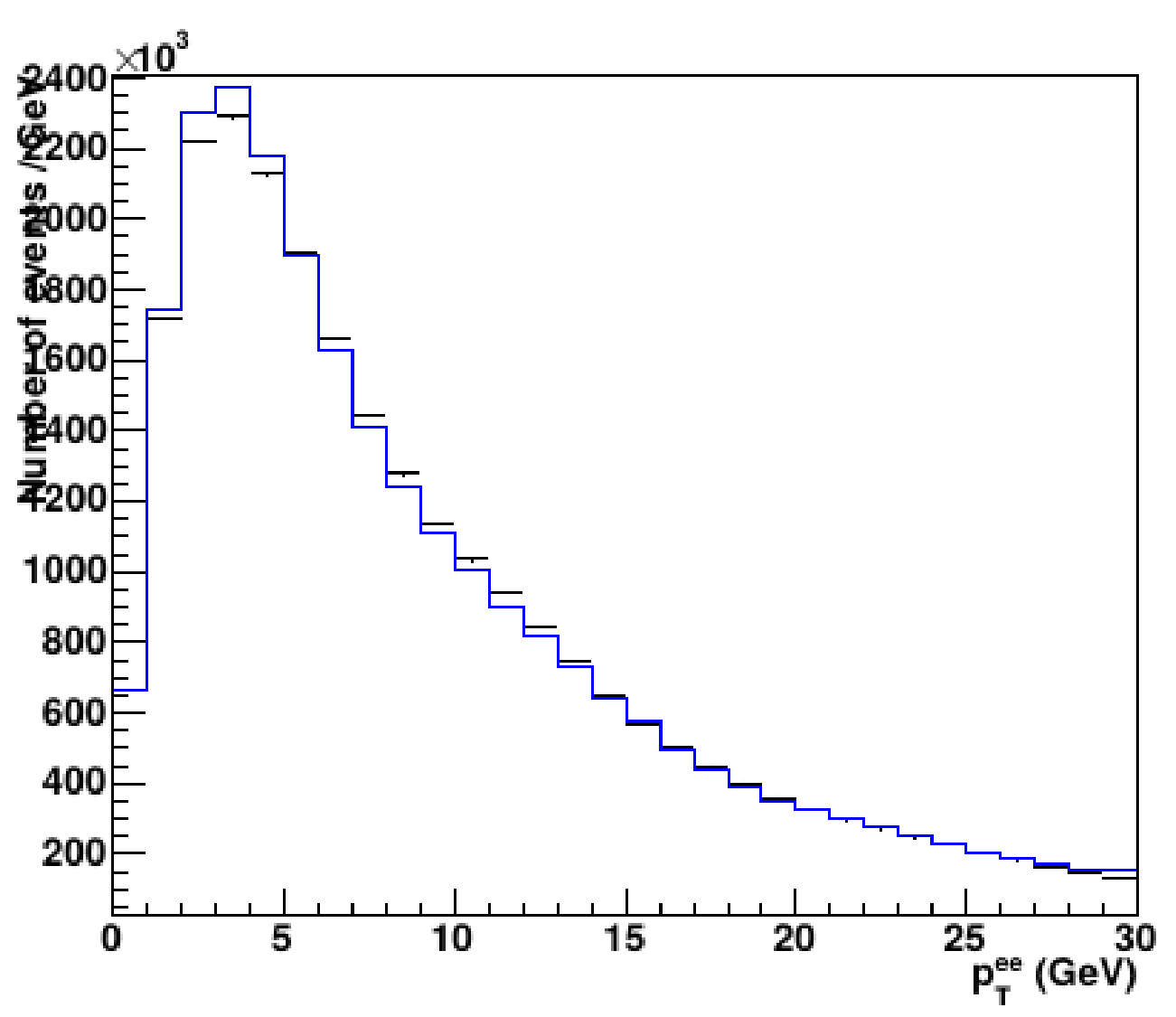



```
// Electron

// constant terms from PRD 89 072003 -- can adjust to absorb missing resolution from secondaries
C1 = 0.006; // constant term towers 1-8
C2 = 0.011; // constant term tower 0

// leakage distribution from NIM A729 25
TF1 *GeantElectronLeakage = new TF1("GeantElectronLeakage","x*x*x*x*x*exp(-x)",0,15);
GeantElectronLeakage->SetNpx(10000);

// energy scale correction accounting for leakage
lscale = 1.0412; // approximate
leakageconst = 1.8;
```

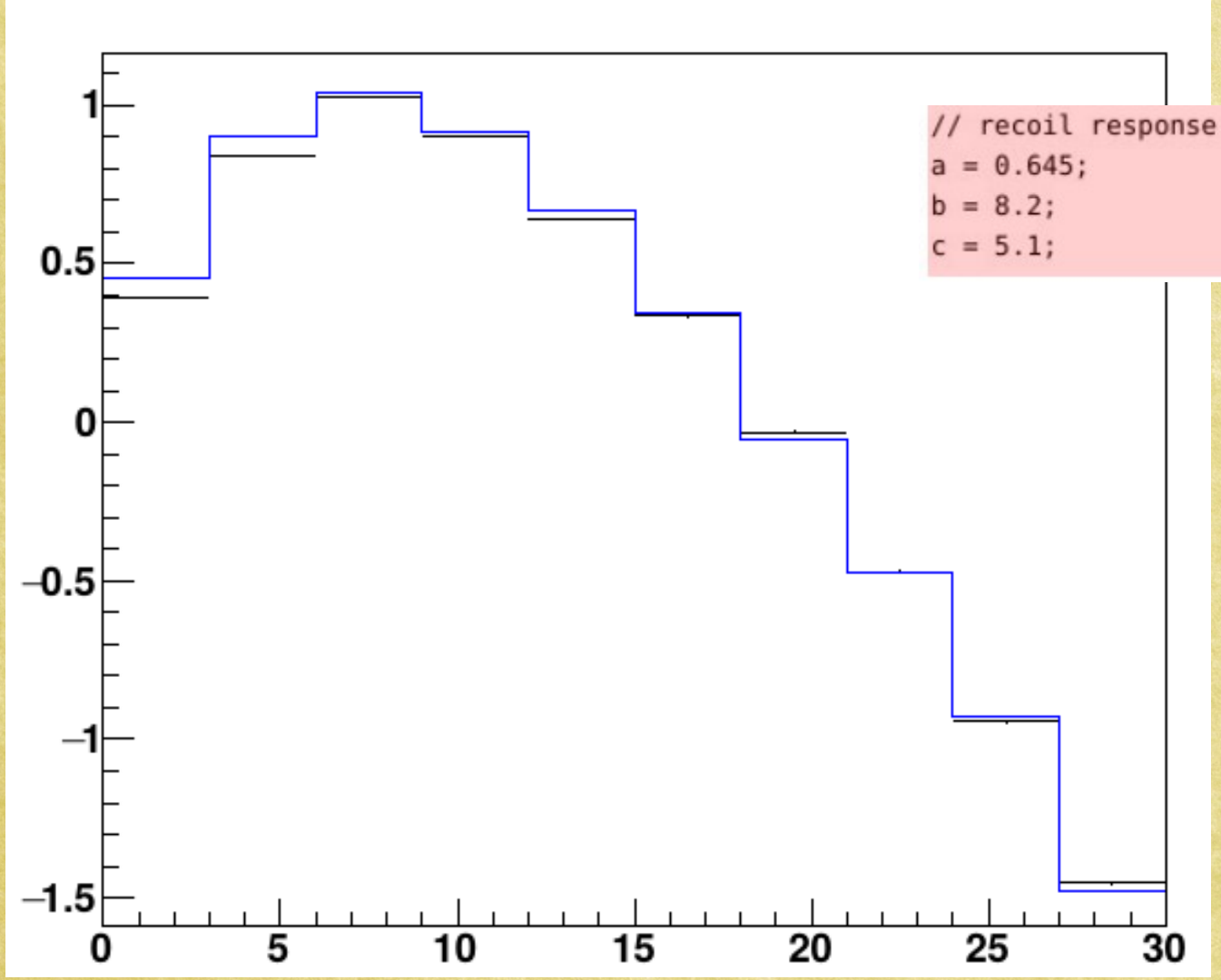
Increased resolution to cover missing term from secondaries: C1 = 0.013 and C2 = 0.013

lscale set to 1.038

Pythia tuning



Recoil response




```
// recoil response function parameters from PRD 89 072003
a = 0.645;
b = 8.2;
c = 5.1;
```

Modified parameters:

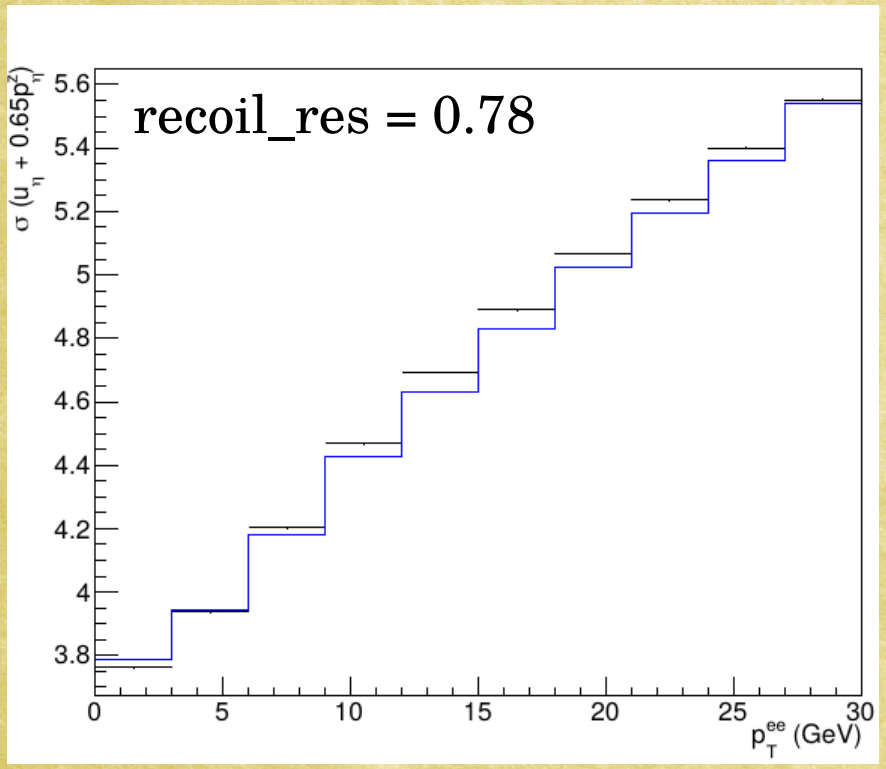
a = 0.632

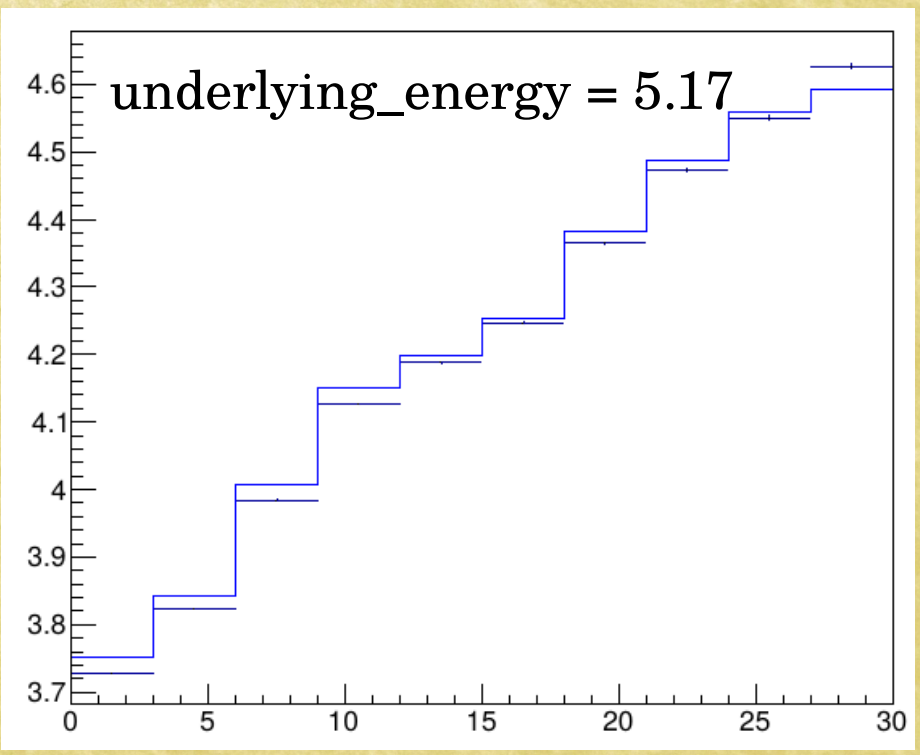
b = 17

c = 3

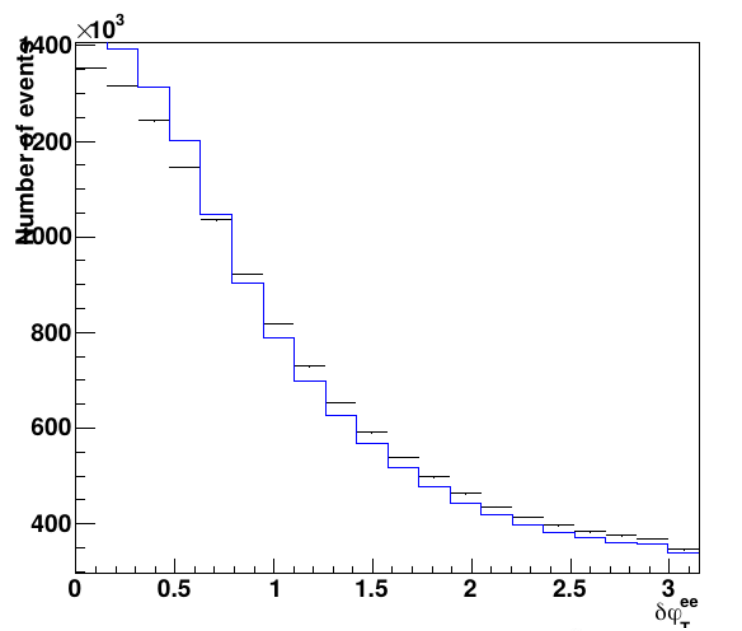
Recoil resolution

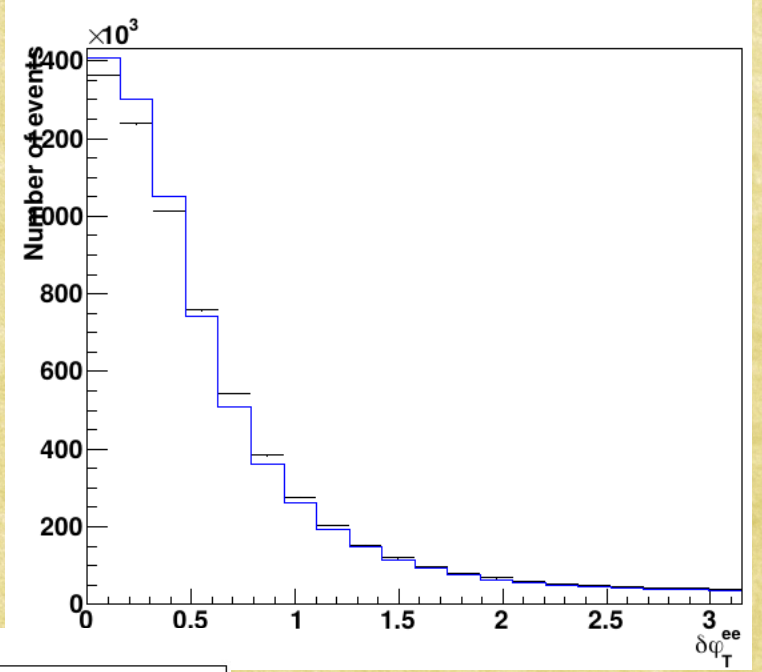
```
// recoil resolution
recoil_res = 0.82; // sampling
underlying_energy = 5.2; // extracted from eta-xi balance plots (Fig 31 of PRD 89 072003) -- needs tuning
lepton_hole = 0.185; // needed for upar comparisons

// Angular smearing functions, adjusted using Fig 31 of PRD 89 072003 -- need tuning
angular_turn = 18.;
angular_start = 0.44;
angular_decrease = 0.30;
```

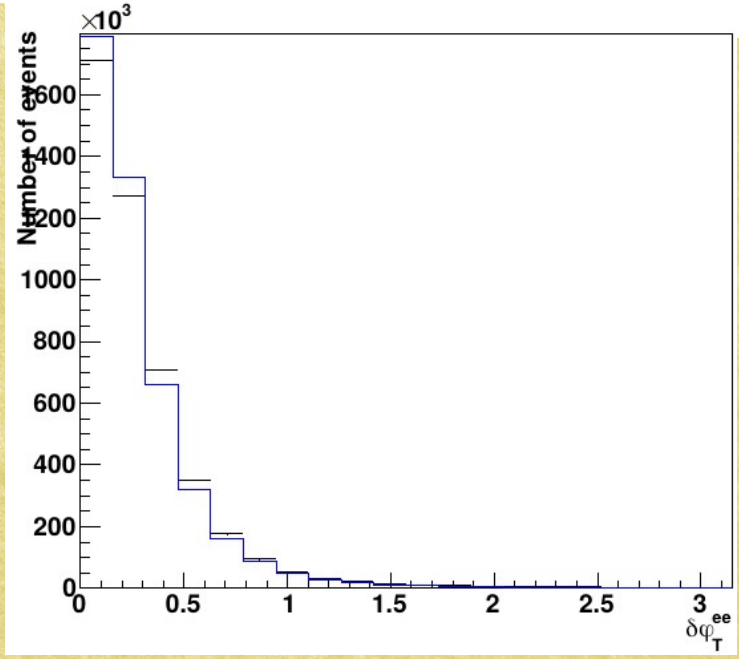




Recoil angular resolution







Angular smearing:

alpha = 0.31

beta = 0.195

gamma = 0.15

$p_T(e)$ in W events