Plug Electron
Gen 5 Data-MC comparison

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Data Samples

Focus on data collected from Feb2002 to Feb2004 (runs 141544-179056) corresponding to 180pb^{-1} of Integrated Luminosity (Good Run List 1011 v.5.0)

Data:

•bhel0d: Central Electron trigger path produced with 5.3.1(for Z->ee CP)

MC:

•ztop2i book= CDFPTOP (Z->ee) no Min Bias

•zewkae book= CDFPEWK (Z->ee + MinBias)

Z->ee CP

Used to check electron energy scales

•Energy of PlugElectron is corrected for Zvertex found by ZvertexColl and all known correction (Face,LERs,etc...)

•PlugElectronEnergy from TopAlgorithms::correctElectron

Z->ee CP selection:

- one Tight Central Electron
- one Plug Electron with:
  - •1.1<|eta|<2.8
  - •E_T>20 GeV
  - •HadEm<0.125
  - •80GeV/c^2 <Mee<100 GeV/c^2

Cuts defining Denominator

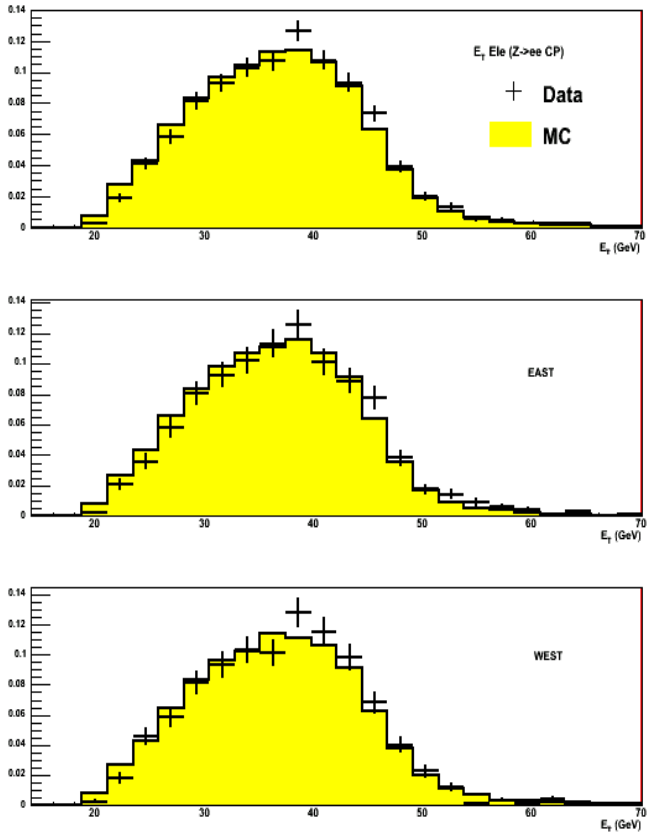
Further Selection:

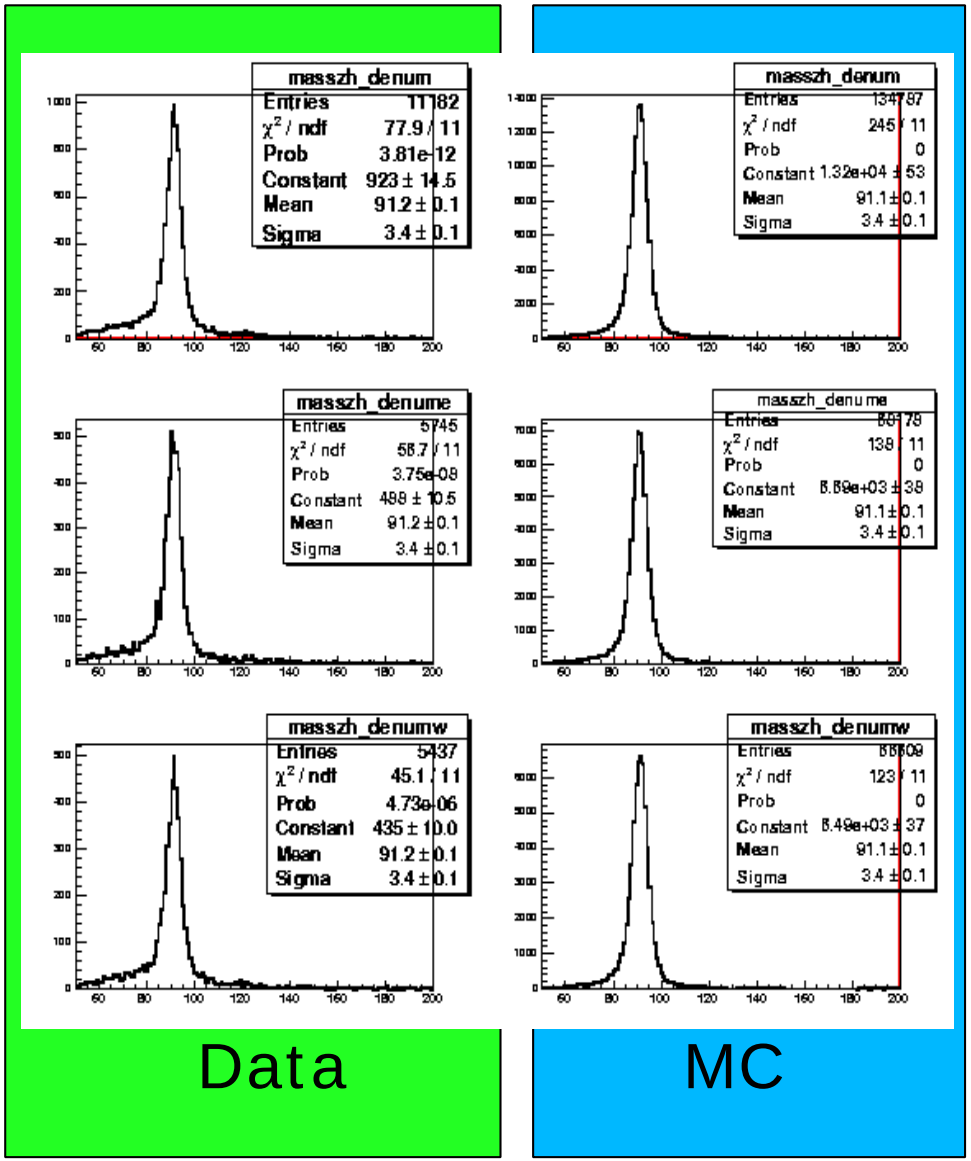
•Hadem<0.05
•Isorel<0.1
•Track Matching (DxDy< 3)
•|Trkz0|<60cm

Cuts to study E/P

Use E/P evaluated from plug electron to check plug material

Energy Tuning(Z->ee CP)





Data

MC

Unchanged if MinBias sample is used.

Comparison with ztop2i MC(No Min Bias)

Z->ee CP background

Background contamination at various selection level has been evaluated from fake rate (vs Jet Et)

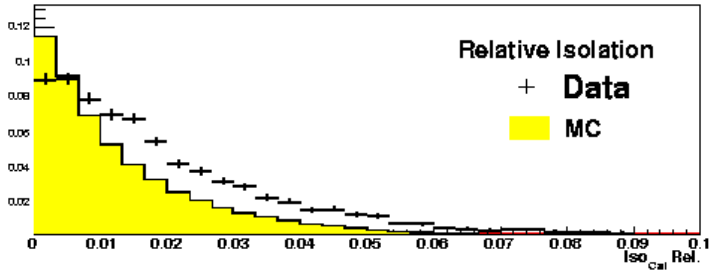
Selection:	Bkg Fraction
Denominator	4.5%
Cuts to study E/P	0.1%

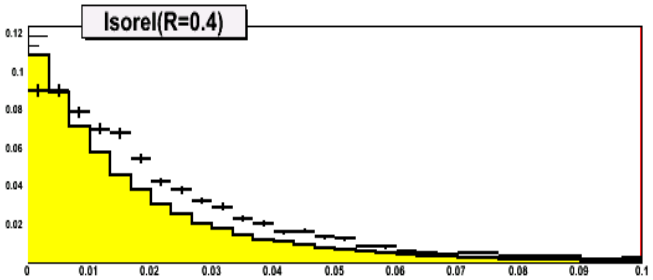
IsoRel

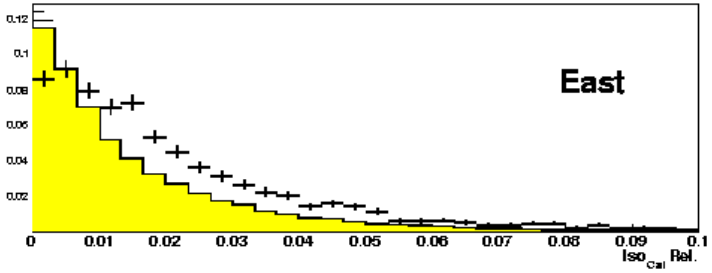
Denominator Selection

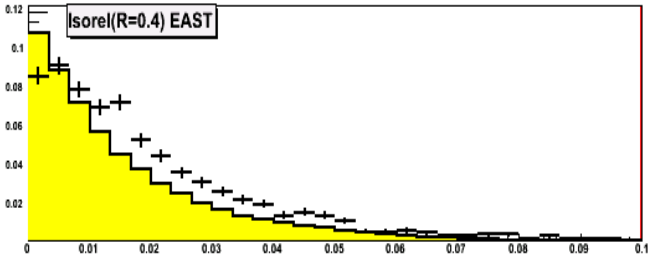
Data: Z->ee CP

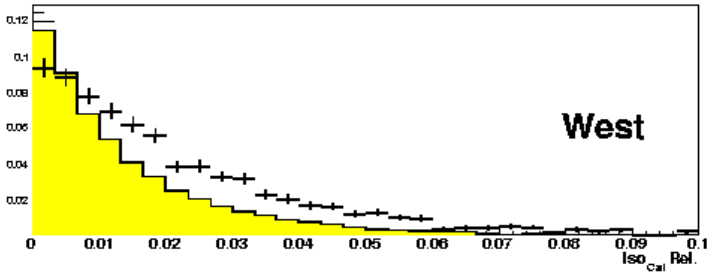
Data-MC ztop2i(No Min Bias) and Data-MC zewkae(MB)

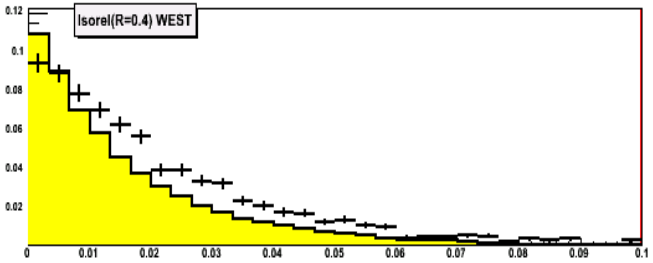








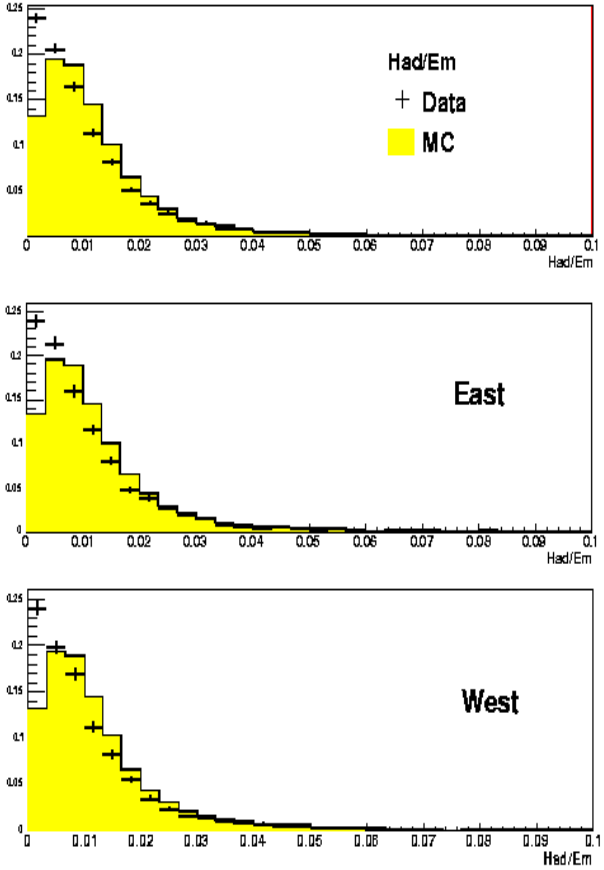


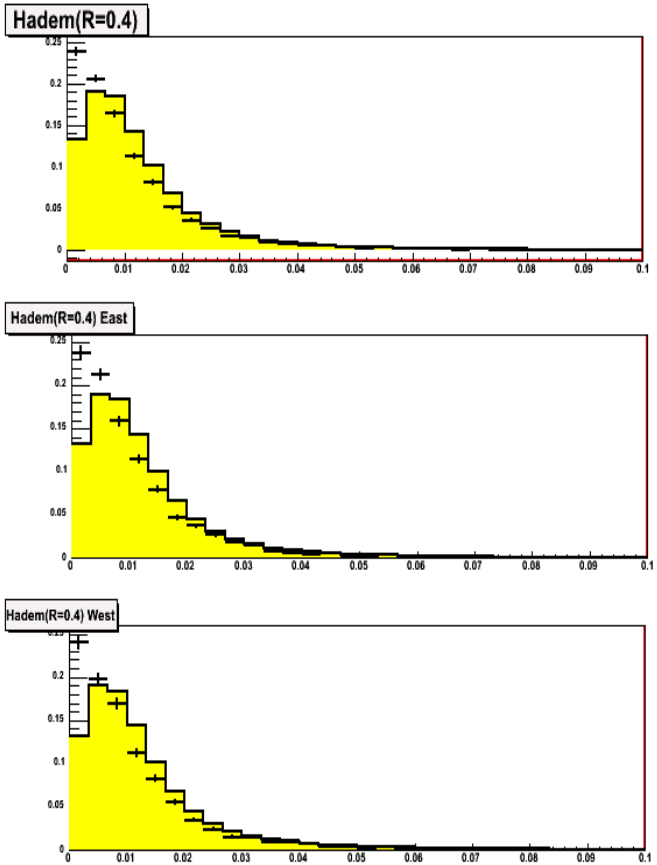


Hadem

Denominator Selection

Data: Z->ee CP
Data-MC ztop2i(No Min Bias) and Data-MC zewkae(MB)





E/P Distributions

Studying E/P to check material after the "Cuts to study E/P"

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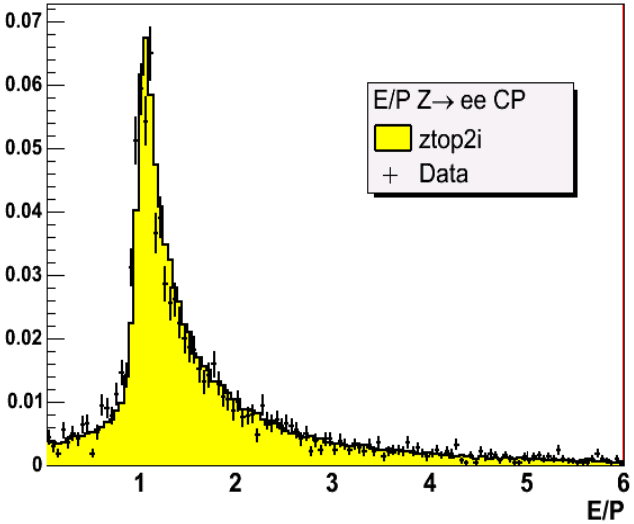
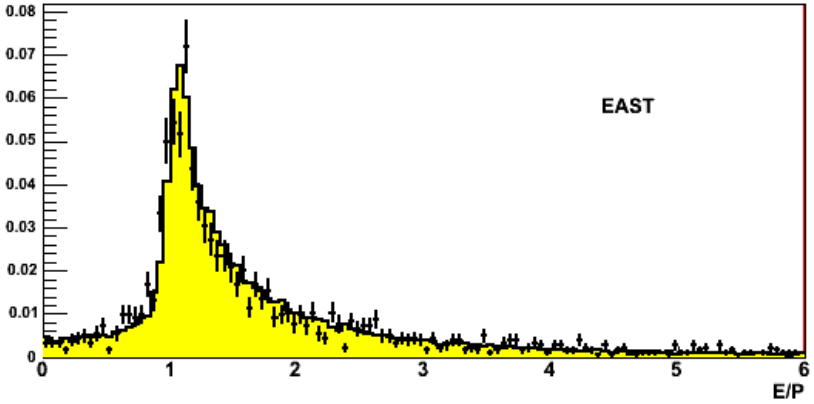
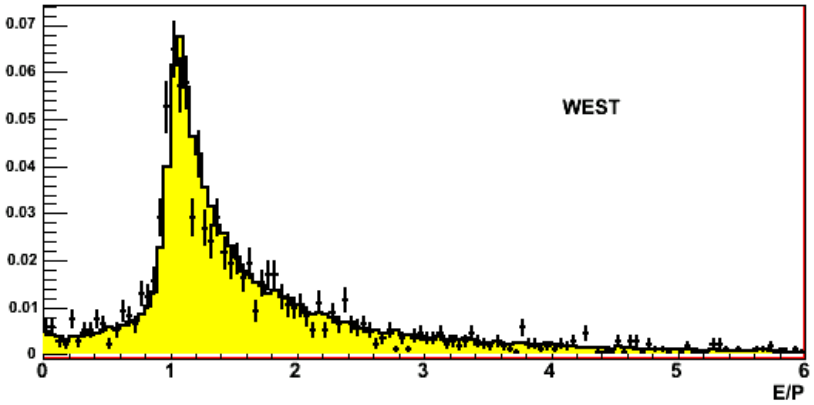
Cuts to study E/P

E/P Distributions

Data-MC ztop2i(No Min Bias)







E/P: Check of material

`Data Z->ee (CP)-MC (ztop2i) -MC zewkae(MB)`

Double Ratio Calculation:

$$\frac{\text{Num evts } lo < E/P < hi}{\text{Num evts } 0.9 < E/P < 1.1}$$

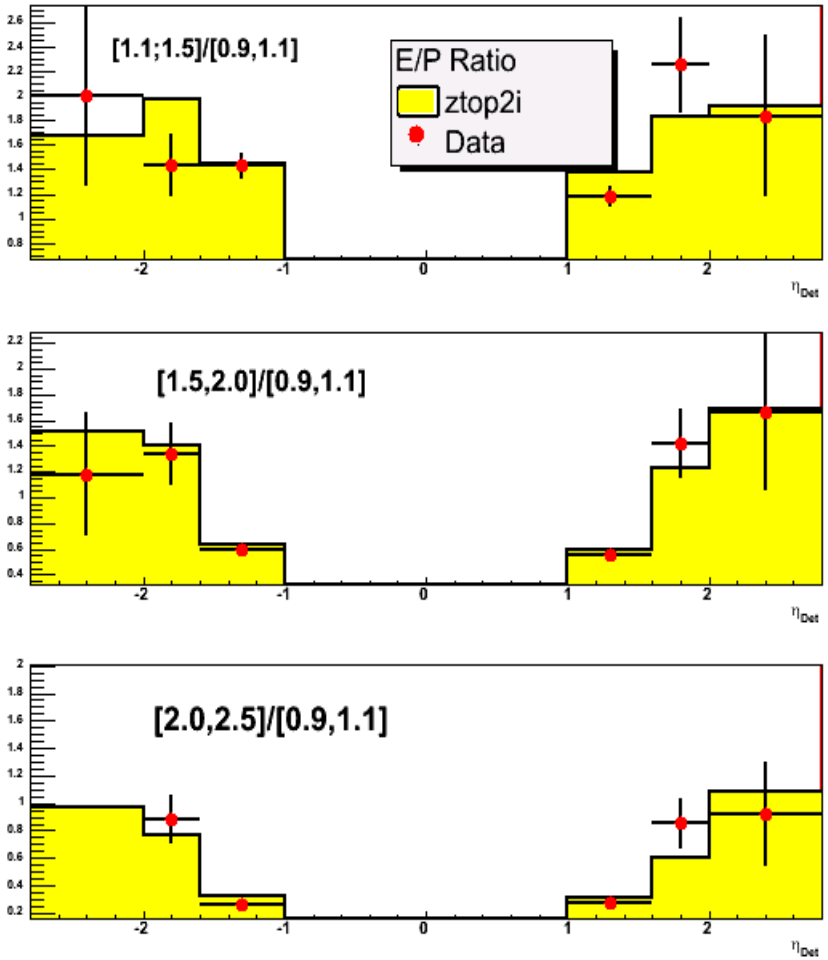
lo,hi	Data	MC	MC(MinB)
1.1,1.5	1.375±0.064	1.508±0.017	1.516±0.012
1.5,2.0	0.700±0.039	0.770±0.010	0.787±0.007
2.0,2.5	0.385±0.026	0.406±0.007	0.416±0.005

about 10%X_0 more material in MC

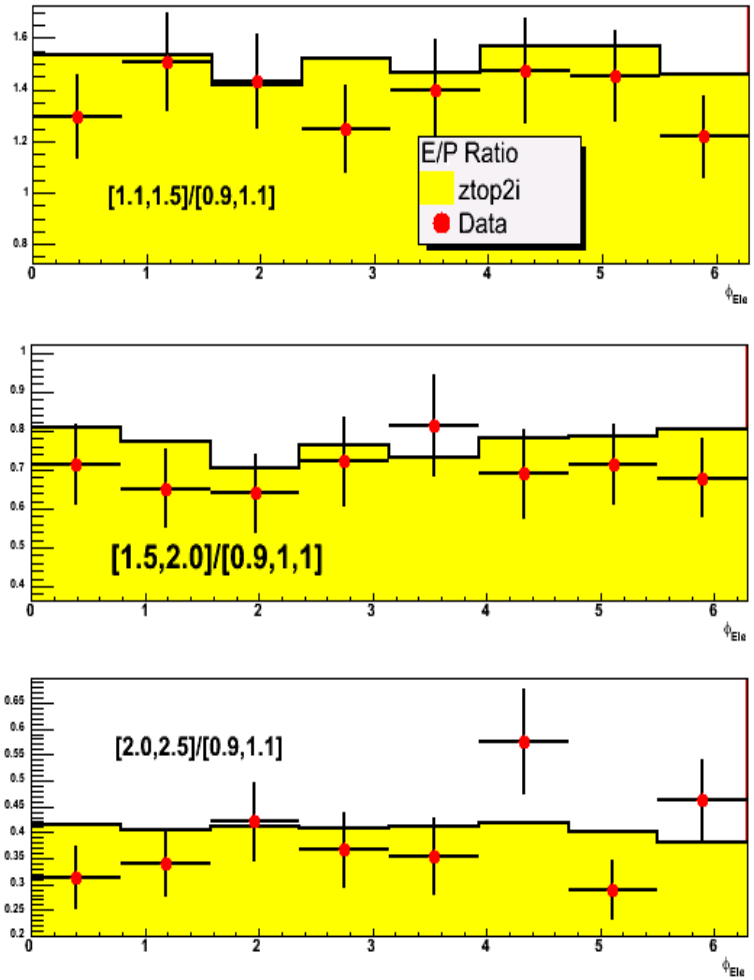
Probably in the copper disks in front of plug z= 167cm

E/P: Check vs Eta Phi

Data Z->ee (CP)-MC (ztop2i)



E/P Ratio vs eta



E/P Ratio vs Phi

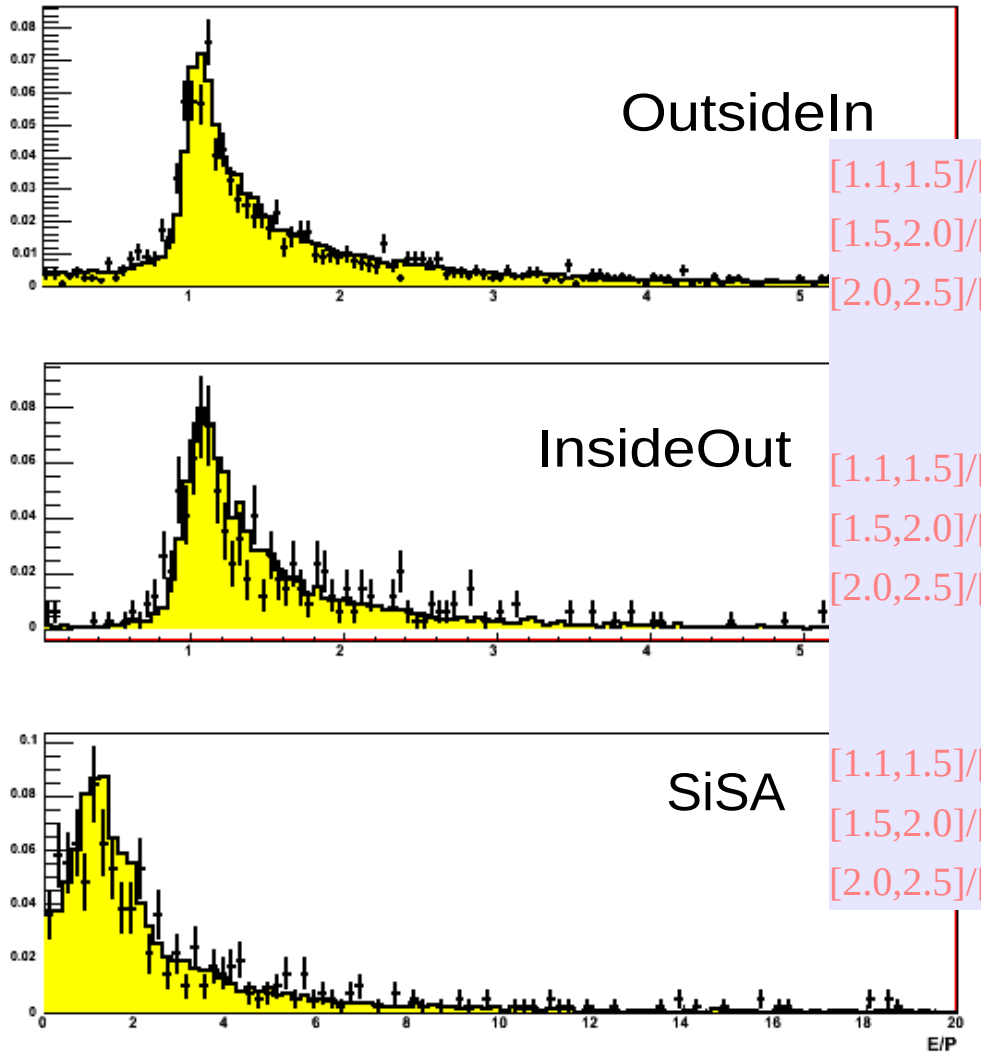
E/P: Check vs Eta

Data Z->ee (CP)-MC (ztop2i)

	[1.1,1.5]/[0.9,1.1]	[1.5,2.0]/[0.9,1.1]	[2.0,2.5]/[0.9,1.1]	
$\eta < -2$	2.0+/-0.7 1.7+/-0.1	1.2 +/-0.5 1.52+/-0.11	2.5 +/-0.9 0.97+/-0.08	DATA MC
$-2 < \eta < -1$	1.4 +/-0.10 1.54+/-0.03	0.71+/-0.06 0.76+/-0.01	0.35+/-0.04 0.40+/-0.00	DATA MC
$1 < \eta < 2$	1.3 +/-0.08 1.45+/-0.02	0.65+/-0.05 0.70+/-0.01	0.34+/-0.03 0.36+/-0.00	DATA MC
$2 < \eta$	1.8 +/-0.7 1.91+/-0.14	1.7 +/-0.6 1.69+/-0.13	0.9 +/-0.4 1.08+/-0.09	DATA MC

E/P: Check vs Track Algos

Data Z->ee (CP)-MC (ztop2i)



	Data	MC
[1.1,1.5]/[0.9,1.1]	1.36+/-0.7	1.48+/-0.02
[1.5,2.0]/[0.9,1.1]	0.67+/-0.04	0.73+/-0.01
[2.0,2.5]/[0.9,1.1]	0.35+/-0.03	0.38+/-0.00
[1.1,1.5]/[0.9,1.1]	1.27+/-0.20	1.59+/-0.05
[1.5,2.0]/[0.9,1.1]	0.73+/-0.13	0.69+/-0.03
[2.0,2.5]/[0.9,1.1]	0.38+/-0.08	0.34+/-0.02
[1.1,1.5]/[0.9,1.1]	1.90+/-0.42	1.94+/-0.10
[1.5,2.0]/[0.9,1.1]	1.31+/-0.31	1.76+/-0.09
[2.0,2.5]/[0.9,1.1]	1.19+/-0.28	1.04+/-0.06

Conclusions

- Seems that MC has slightly (~ 10% X_0) more material in front of Plug
- We think it is located in the copper disks in front of plug
- Plans: Would like to generate ztop2i with ~ 10% less X_0 in Plug and check again ratios of E/P

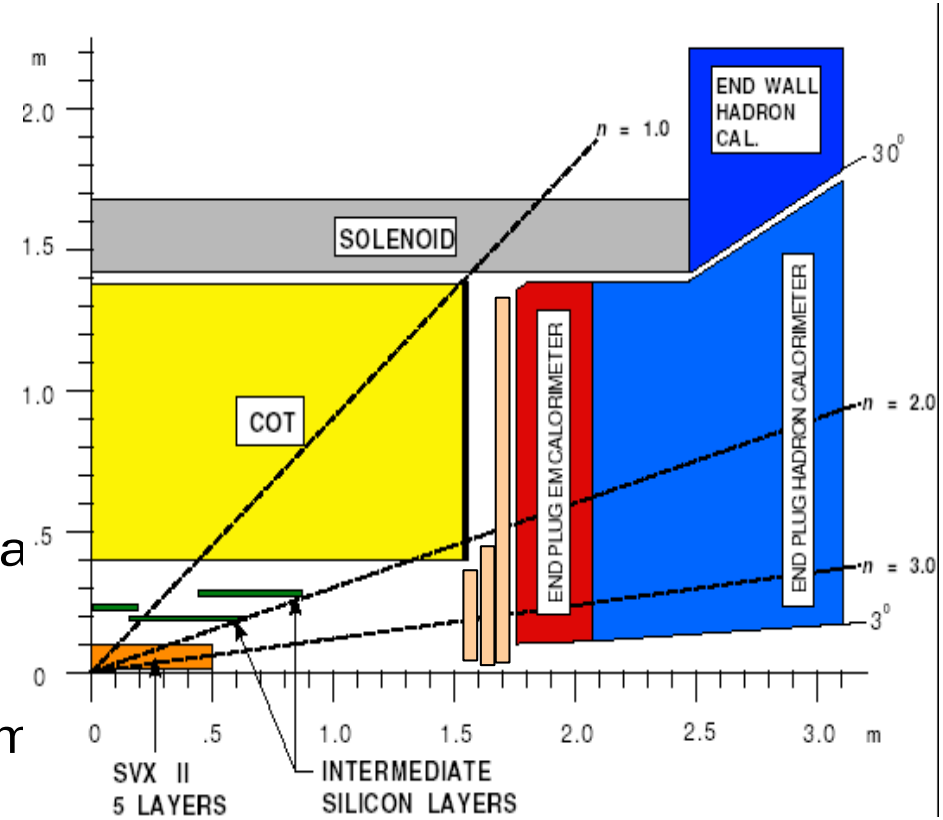
Copper Disks

from SiliconGeometry/src/HWSiDetectorNode.cc

All units in cm

#Disk	Int. R	Outer R.	Z pos	width
1	5	140	167	0.7
2	5	46	167.7	0.7
3	5	29.5	168	0.01

eta region	1<|eta|<2	2<|eta|<2.4	2.4<|eta
Cu Width	7 mm	14.0 mm	14.1 mm



10% of X_0 is ~1.4mm

Efficiencies (MC Z->ee CP)

Comparison with ztop2i MC(No Min Bias) and zewkae (MB)

Z->ee	Eff	Delta(Eff)	Eff	Delta(Eff)
Iso+Hader	0.983	0.000	0.997	0.000
DxDy<3	0.543	0.001	0.531	0.002
Trkz0<60	0.999	0.000	0.999	0.000
E/P< 2	0.737	0.002	0.742	0.002

Z->ee + M	Eff	Delta(Eff)	Eff	Delta(Eff)
Iso+Hader	0.979	0.000	0.980	0.000
DxDy<3	0.540	0.001	0.537	0.001
Trkz0<60	0.999	0.000	0.999	0.000
E/P< 2	0.736	0.001	0.740	0.002

Slightly lower efficiency on IsoRel Cut
but Isorel,hadem, trk match, Trkz0, E/P are evaluated from Data

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