Layout and Setup...

Signal only, efficiency

Track Efficiency

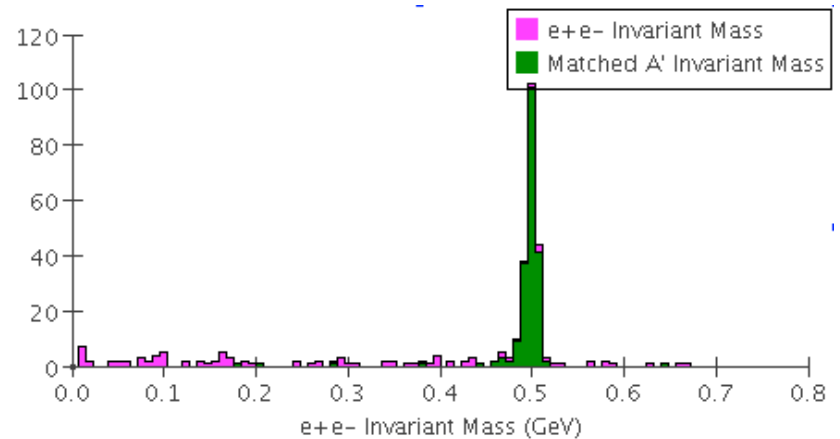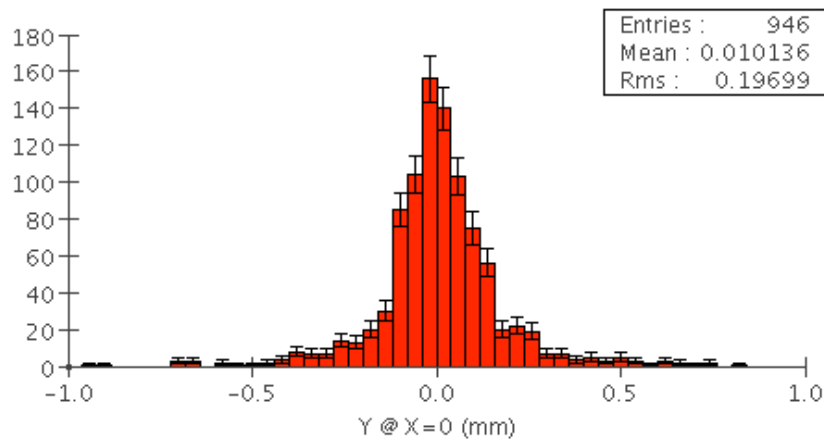...theta is the track
angle in the X-Z plane
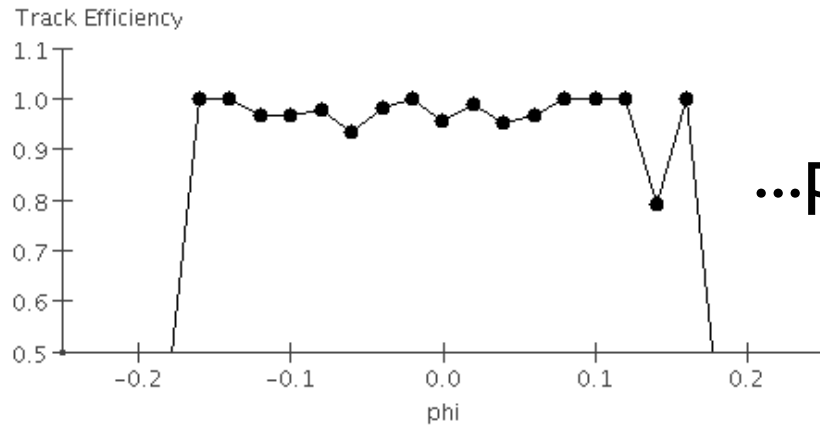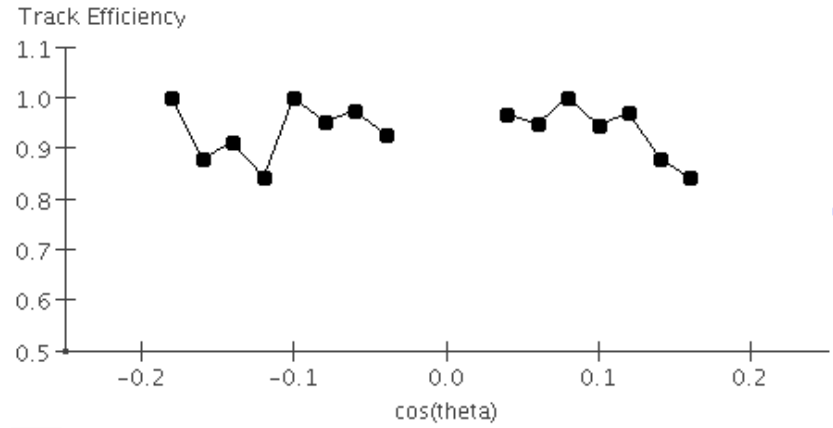
Track Efficiency

...phi is the track angle
in the X-Y plane

Efficiency to find both
e+e- tracks from A' ~ 0.22
(for 500 MeV A')

e+e- Invariant Mass
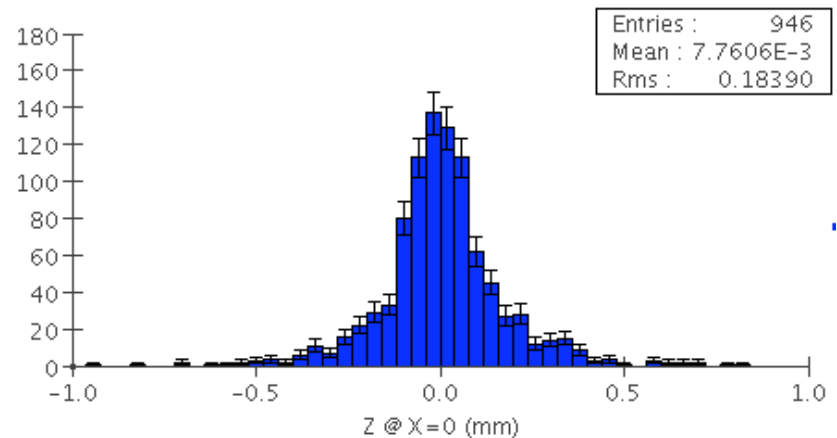Matched A' Invariant Mass
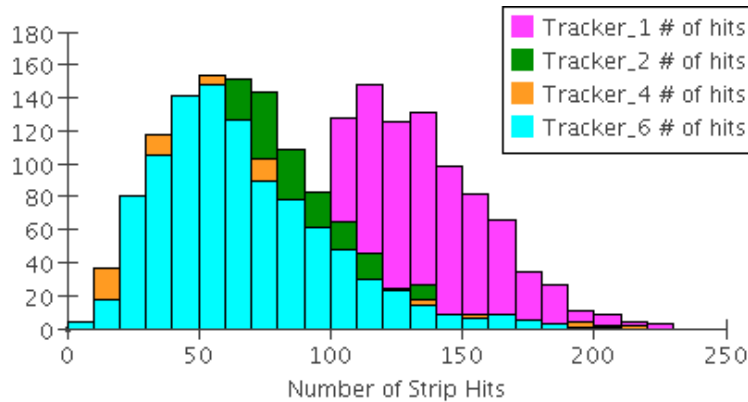
e+e- Invariant Mass (GeV)

Signal only, residuals

I extrapolate the track back to the target (X=0) and look at the Y, Z positions...use this to reject fakes

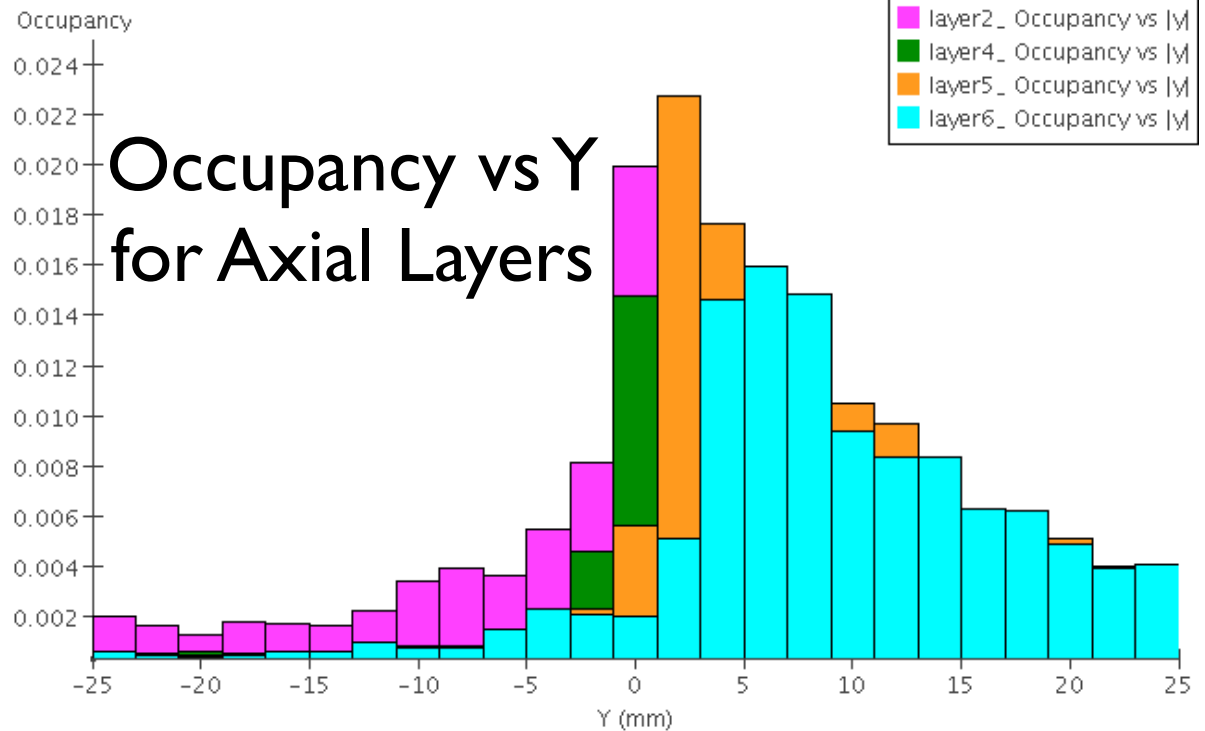widths of the core gaussians are ~100μ (Y) and 125μ (Z) but there are pretty long tails

Occupancies with 10k e⁻ through 0.01 W...

assumes a perfect beam

# of strip hits/event
\<Layer 1>~125
\<Layer 2>~60 ????

Occupancy vs Y
for Axial Layers

the average module occupancy is ~1%, but inside a module it's higher near the beam
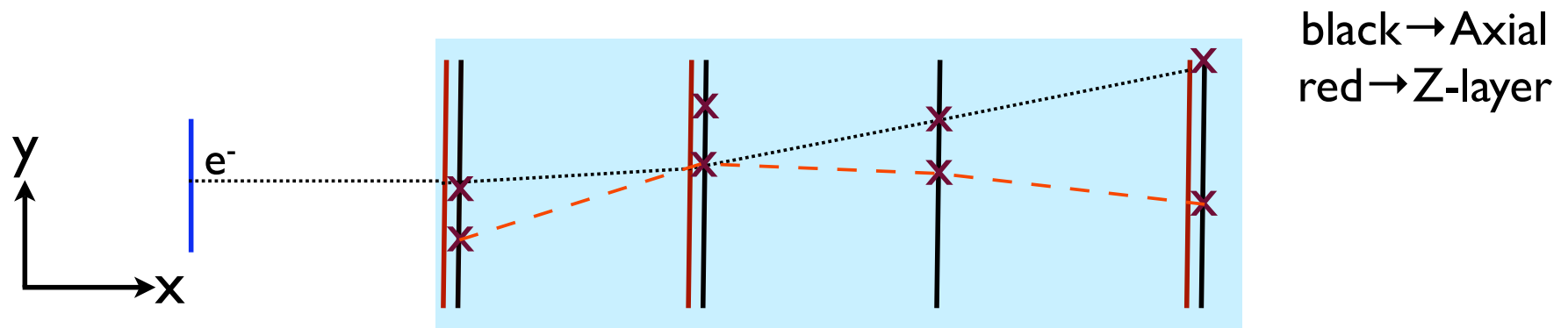
Ghosts and fakes

...with 50 hits/layer and 90° stereo→ 2500 space points/bilayer!
→reduce this some by requiring hits be in corresponding
modules...still, have typically 2k space points/event (over all
layers)
   →Fake track combos can be a problem!

black→Axial
red→Z-layer

...basic χ^2 requirements on circle (XY) and linear (XZ) fits..but we aren't too over-constrained
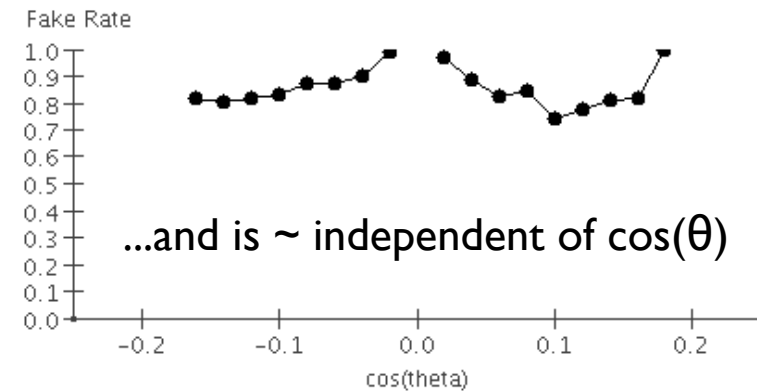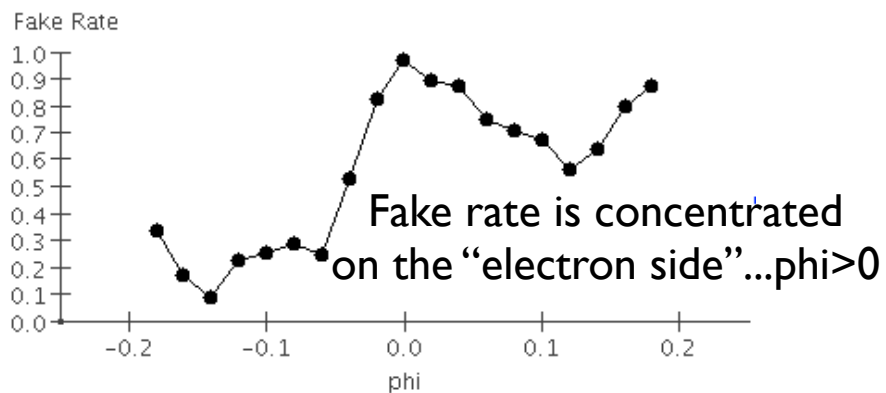...require that each 2-point combo (and entire track) points back to Z=0 @ X=0
...require that entire track points back to Y=0 @ X=0
...require the track has a reasonable momentum...less than 6GeV
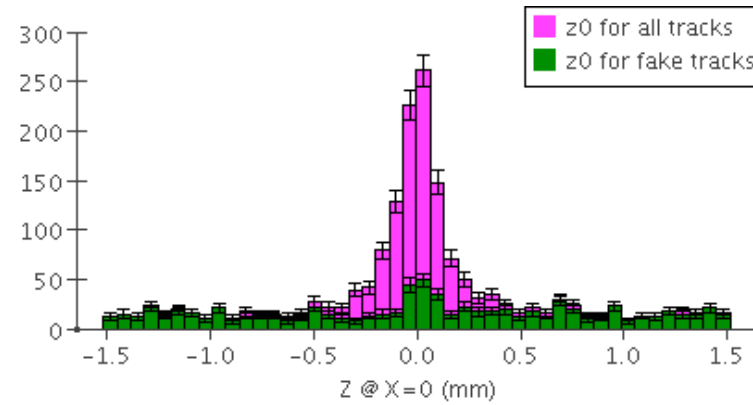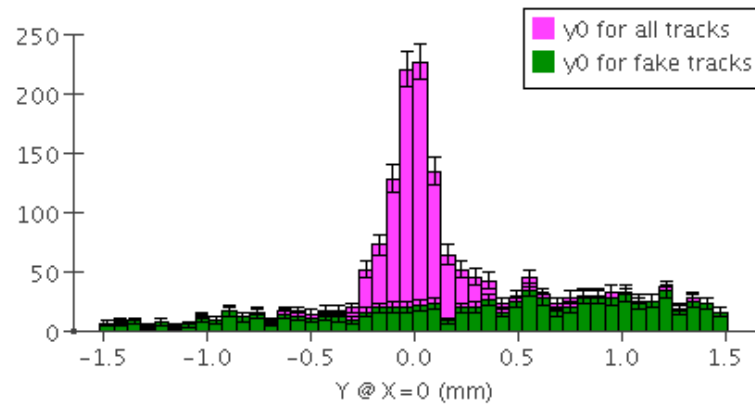
Tracking results with 10k beam electrons
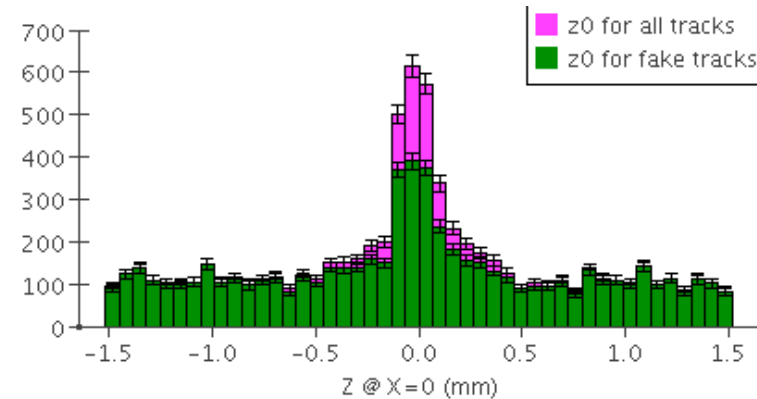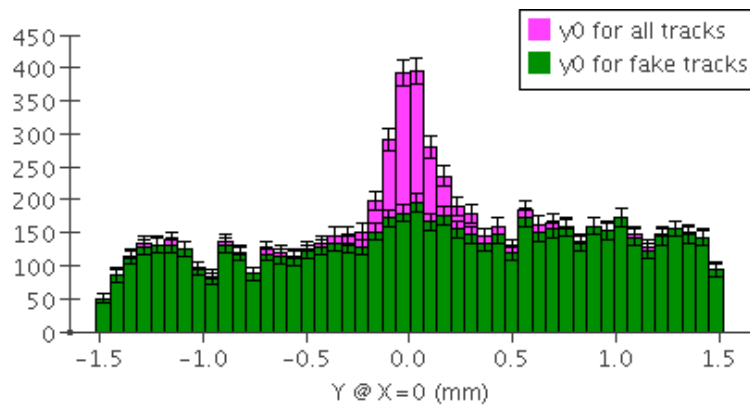
Right now, cutting loosely: Y_0, $Z_0 < 1.5$mm → #fakes/#total ~ 0.85
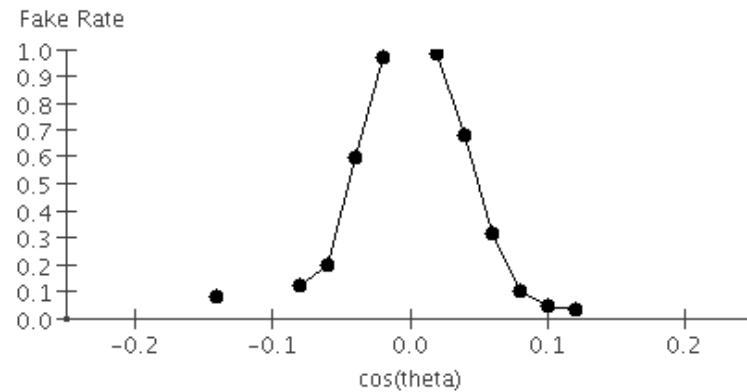
...reconstruct ~ 8.5 "tracks"/event

Fake rate is concentrated on the "electron side"...phi>0

...and is ~ independent of cos(θ)

Test using shorter strips...

Fake rate goes down (~0.45) and is concentrated at low phi/cos(theta)
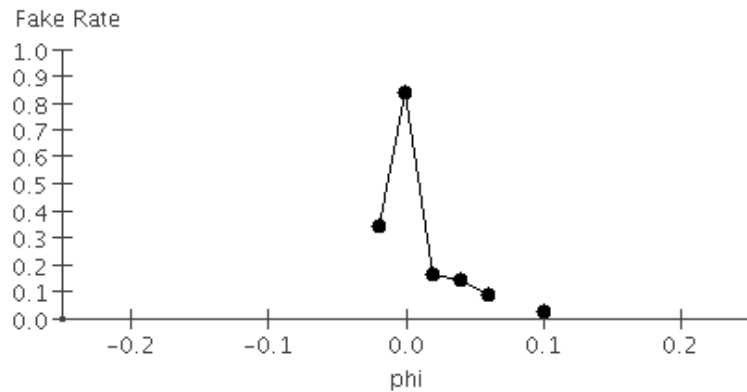
...or, put in a vacuum...
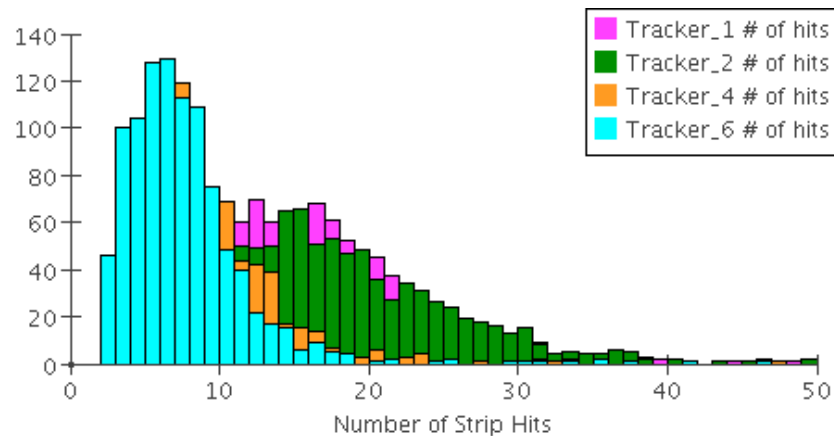
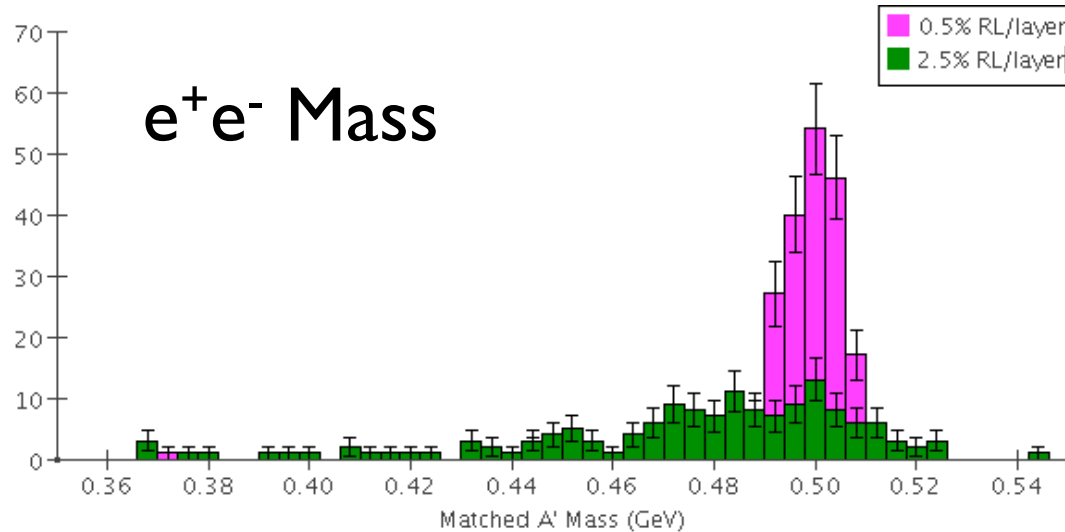
reduce density of "air" to 0.012×10^{-3} g/cm^3

...number of hits/layer is reduced by ~ x10[***]

...reconstruct 0.13 tracks/bunch and they are "real" tracks...not random combinations of hits

→Signal track finding shouldn't be an issue in this environment

[***] increased bunch size from 10k→15k and use a beam size of 200μ in x and y

Adding 2.5% RL/layer for services...

e⁺e⁻ Mass

going from 0.5% (0.3μ of Si) to 2.5% (pessimistic) makes the reco signal resolutions very bad and reduces the efficiency by ~25%

Y0

Z0