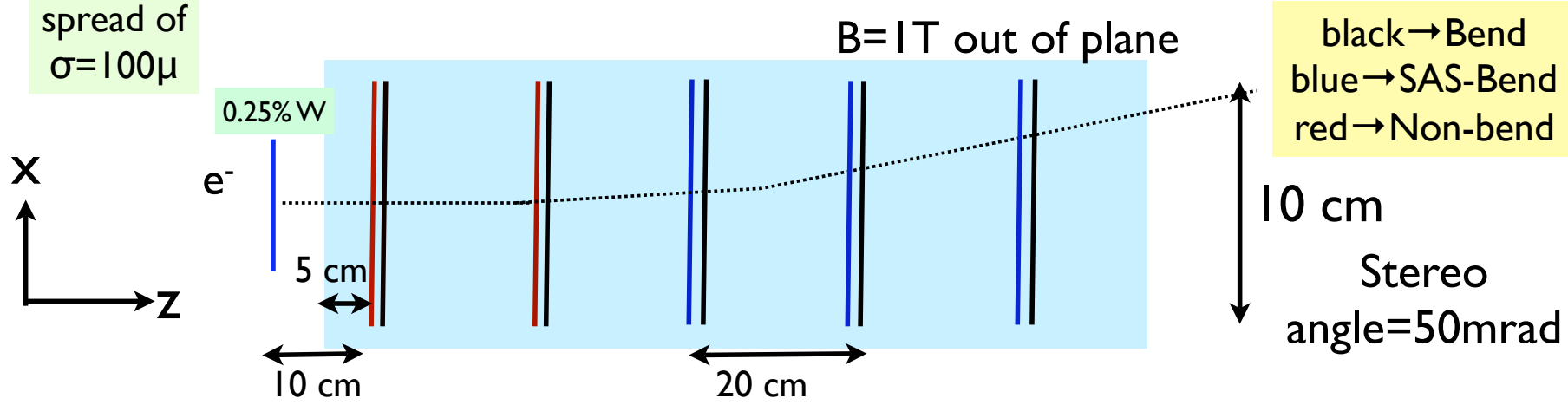
Layout and Setup...v2.8

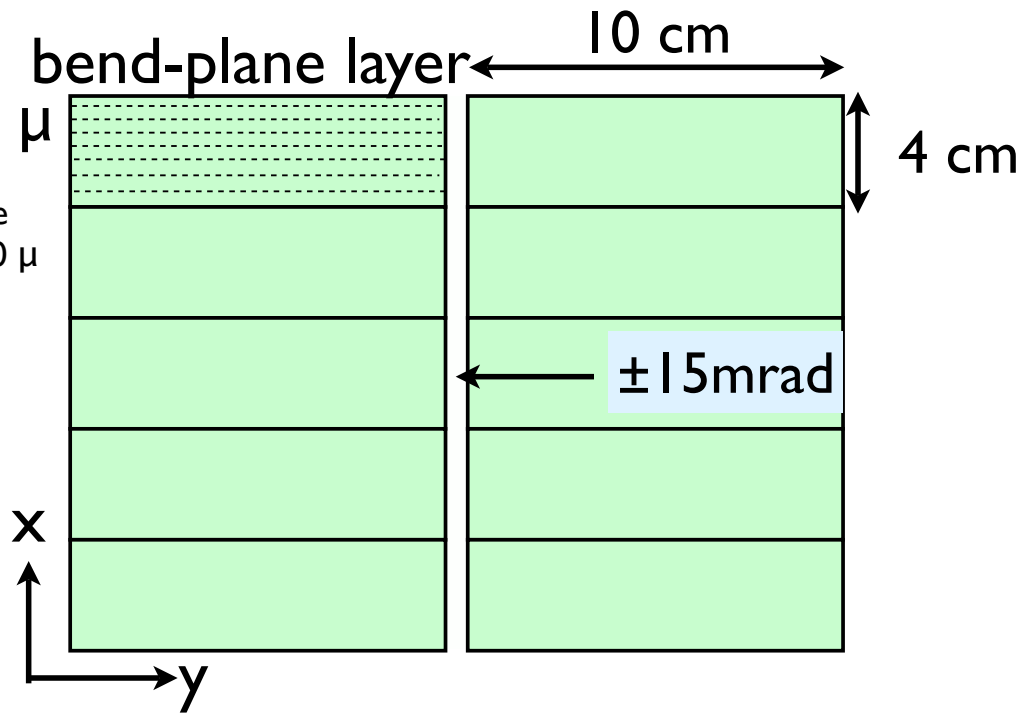
xy beam spread of σ=100μ



Silicon is 300μ thick, "services"=0.2%/layer; detector is in ***vacuum***

readout chip=APV25
→7.5 ns integration

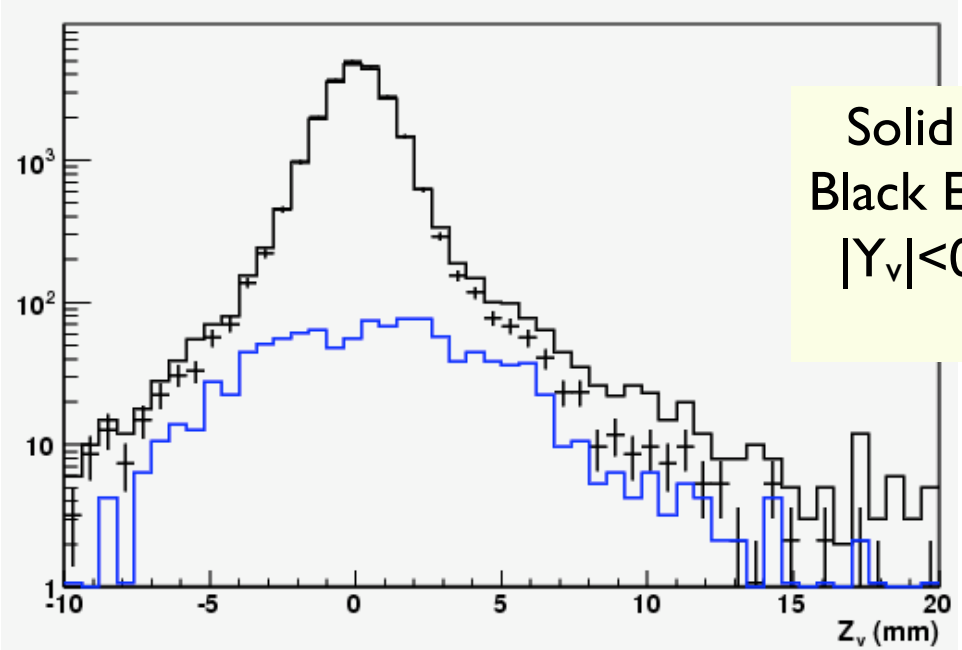
pitch=60 μ
with intermediate strips every 30 μ



I am trying to use coordinates consistent with everyone else...these are not what's used in lcsim

Vertex Selection #1

Next 3 slides are all:
200MeV A´ decays @
0cm in 400nA

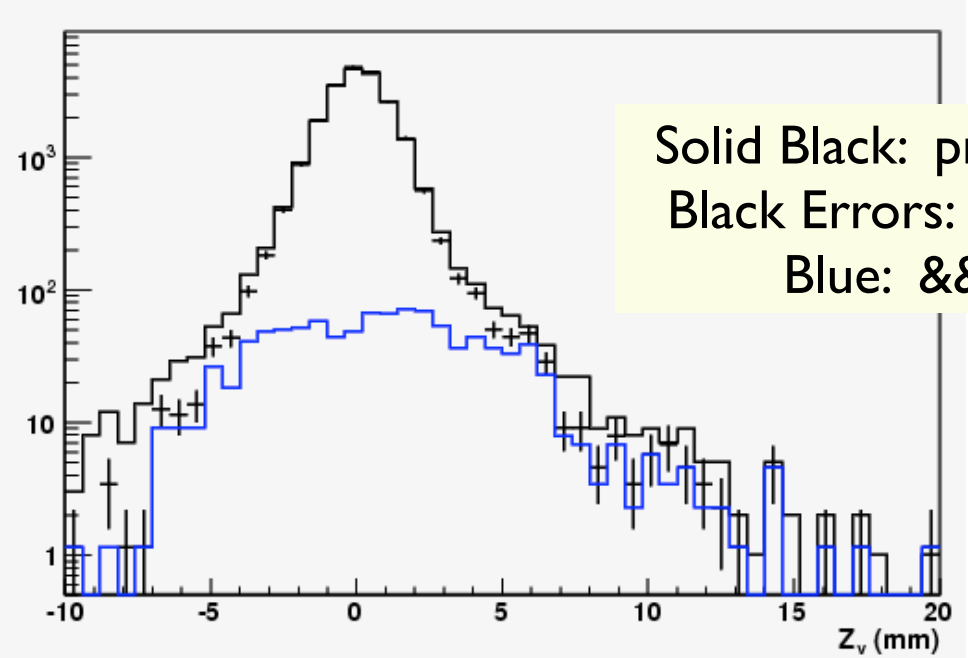


Solid Black: good e+e- tracks
Black Errors: &&$|X_v|$<0.4mm &&
$|Y_v|$<0.4mm&&χ^2(vertex)<250
Blue: &&>0 mishits

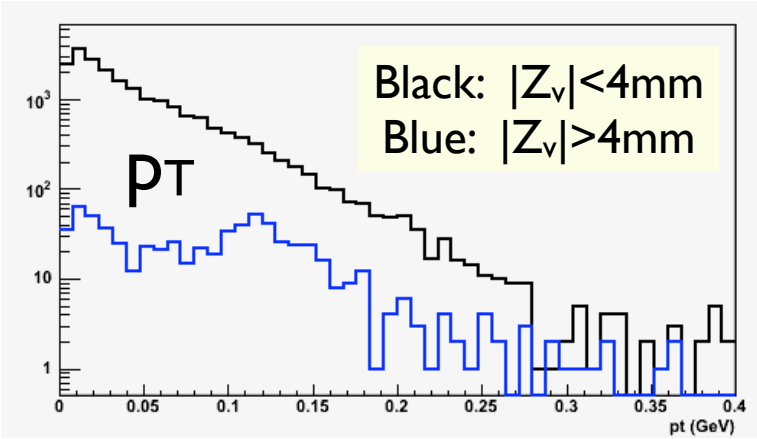
Good track==|Xoca|<0.5mm &&
|Yoca|<0.5mm&&χ^2(track)<100
~90% efficient

	"$\epsilon(A')$"	RMS(Z_v)	f(>4mm)	f(>1cm)
Loose (solid)	0.19	2.03	0.040 (0.63)	0.012
Tight (errors)	0.18	1.65	0.022 (0.51)	0.003 (0.63)

Vertex Selection #2

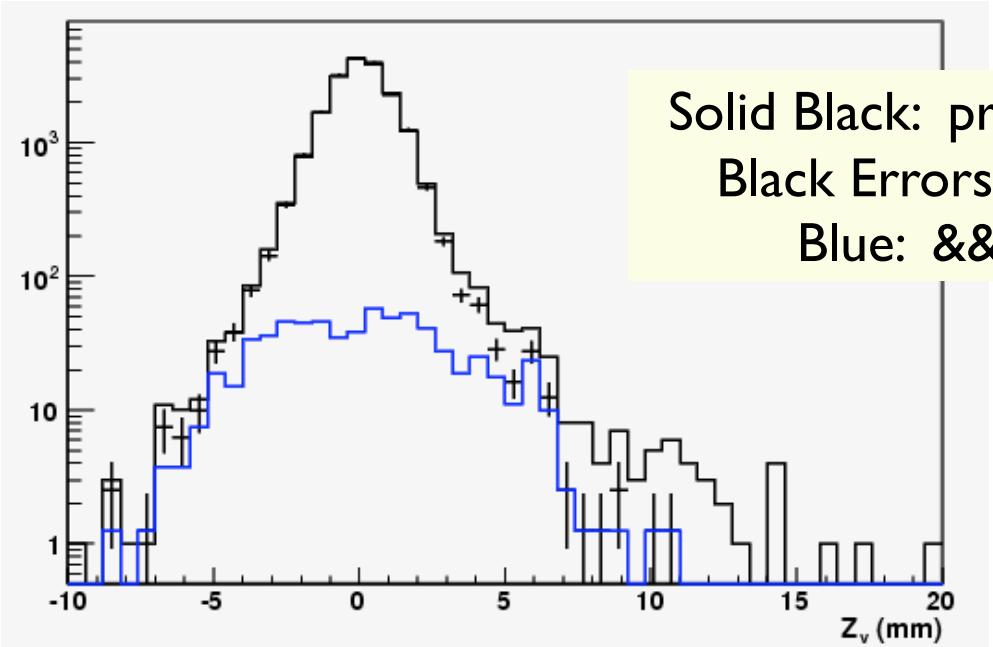


Solid Black: previous tight cuts
Black Errors: && p_T<100MeV
Blue: &&>0 mishits



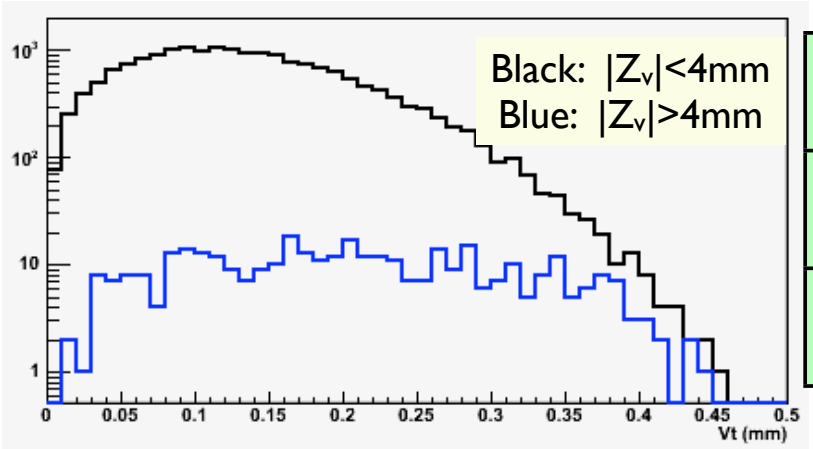
	"ϵ(A′)"	RMS(Z_v)	f(>4mm)	f(>1cm)
Loose (solid)	0.18	1.65	0.022 (0.51)	0.0026 (0.63)
Tight (errors)	0.17	1.45	0.016 (0.70)	0.0017 (0.85)

Vertex Selection #3



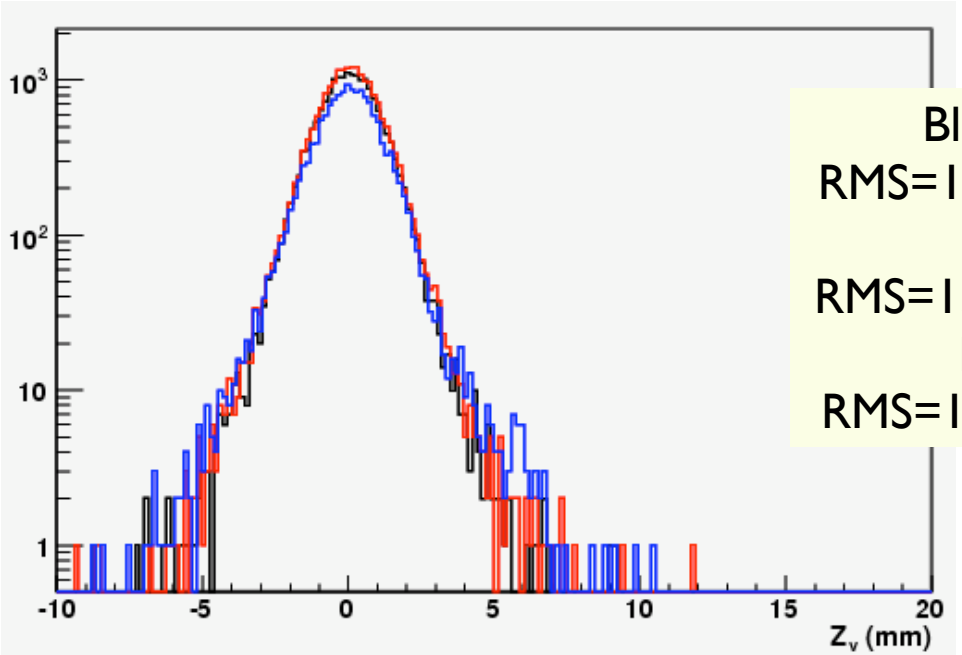
Solid Black: previous tight cuts
Black Errors: && V_T<200μ
Blue: &&>0 mishits

...in practice, wouldn't cut on p_T or V_T but instead require that V0 candidate points back to beamspot...



	"ϵ(A′)"	RMS(Z_v)	f(>4mm)	f(>1cm)
Loose (solid)	0.17	1.45	0.016 (0.70)	0.0017 (0.85)
Tight (errors)	0.14	1.27	0.008 (0.62)	0.0001 (1.0)

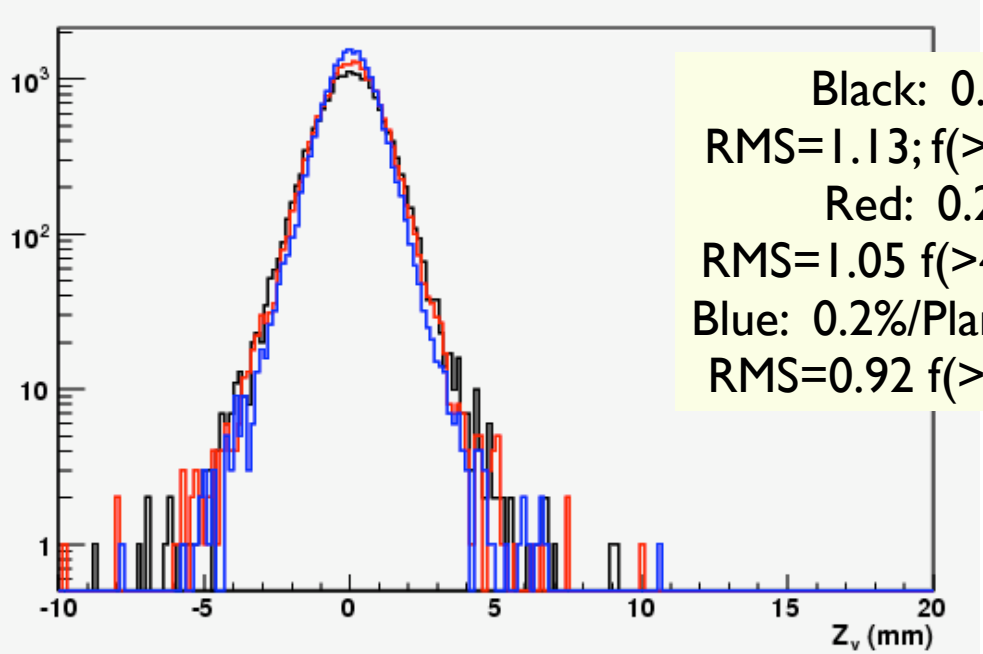
Rate dependence on Z_v



Black: No Pileup;
RMS=1.13; f(>4mm)=0.003
Red: 100nA;
RMS=1.15 f(>4mm) =0.004
Blue: 400nA;
RMS=1.27 f(>4mm)=0.008

Using the tight cuts as on previous slide

Varying material and Z_v



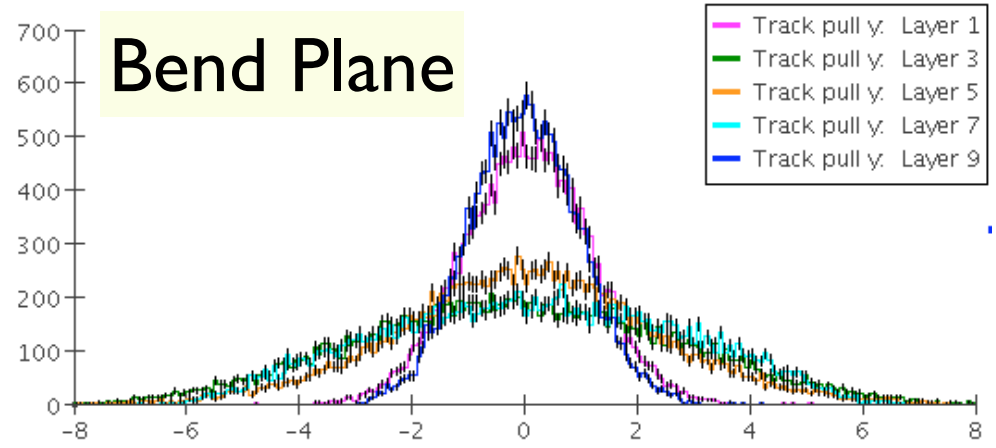
Black: 0.4%/Plane
RMS=1.13; f(>4mm)=0.0026
Red: 0.2%/Plane
RMS=1.05 f(>4mm) =0.0018
Blue: 0.2%/Plane/thin Si in #1
RMS=0.92 f(>4mm)=0.0013

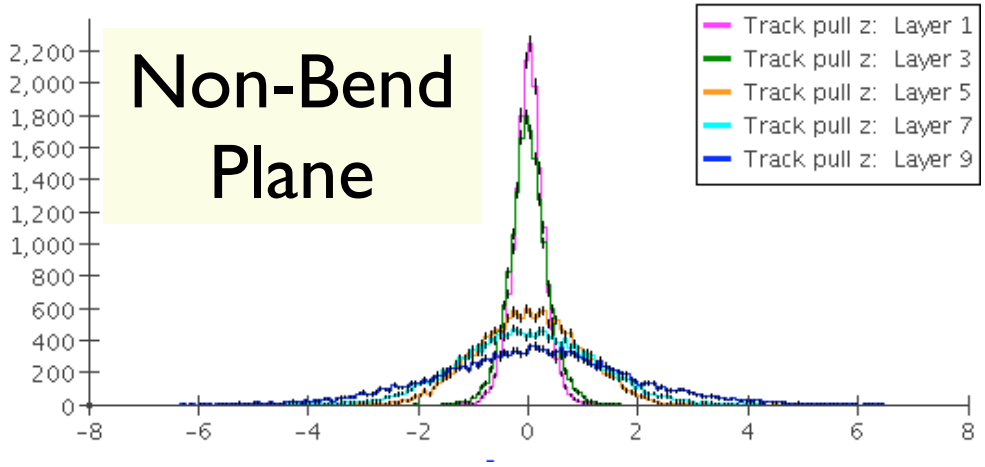
No pileup!

Using the tight cuts as on previous slide

all points are from good hits from 5-plane positron tracks

Pulls for hits on track





RMS	Pull X	Pull Y
Plane 1	1.11	0.27
Plane 2	2.73	0.36
Plane 3	2.26	0.93
Plane 4	2.55	1.19
Plane 5	0.96	1.70

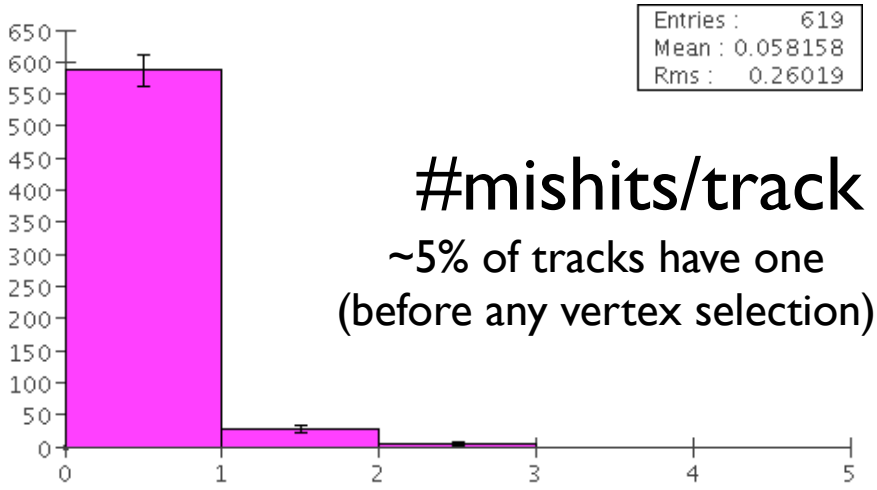
$\text{Pull}=(X_{hit}-X_{track})/\sigma_{hit}(X)$

sigma includes MS errors

..very narrow for planes 1 +2 for non-bend plane. But wide for most layers in the bend plane...?

Bad hits...where/how many/how bad?

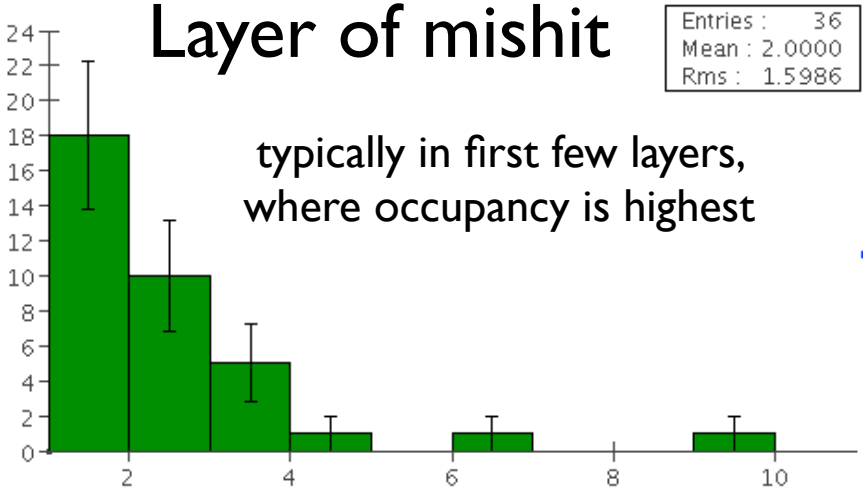
200MeV A´ decays @
0cm in 400nA



#mishits/track

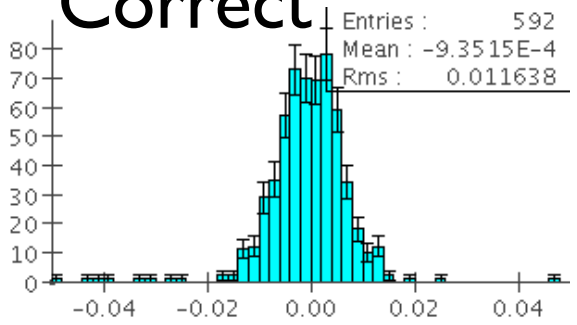
~5% of tracks have one
(before any vertex selection)

Layer of mishit



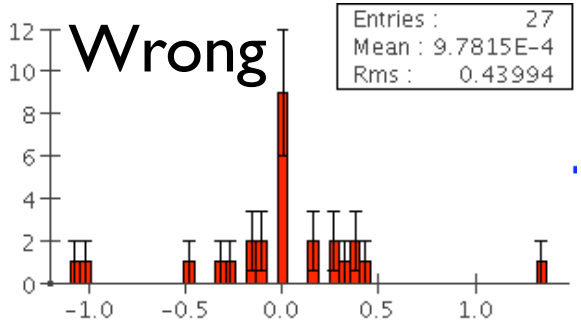
typically in first few layers,
where occupancy is highest

Correct



Y_{hit}-Y_{mc}

Wrong



Y_{hit}-Y_{mc}

Notes...

- Looks like we can come up with some reasonable cuts to improve the Z_v resolution closer to where we want it
  - on the tails, tracks with mishits are a problem (but not the whole problem)
  - we need a lot more events in order to really study this...
- The tails get worse with higher rates and better with less material...no surprises.
- The per-hit pulls look pretty bad; need to look at the track fitter more closely...this could effect the vertex resolution