SuperB: DCH Update on FullSim Bkg Studies

Dana Lindemann McGill University

DCH Update March 14, 2011

Overview

New vs. old geometries:
 With the plug/ horseshoe shielding added

 Note: My occupancies are normalized to ~215 MHz, while Riccardo's is 266 MHz. I still need to check/fix this.

New Vs. Old Prod. Geometries

Hit positions of all generated Bhabha primaries - old Geom

Beam pipes not modelled

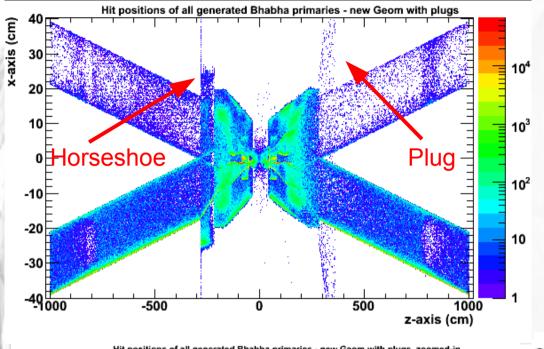
Beam pipes not modelled

Beam pipes not modelled

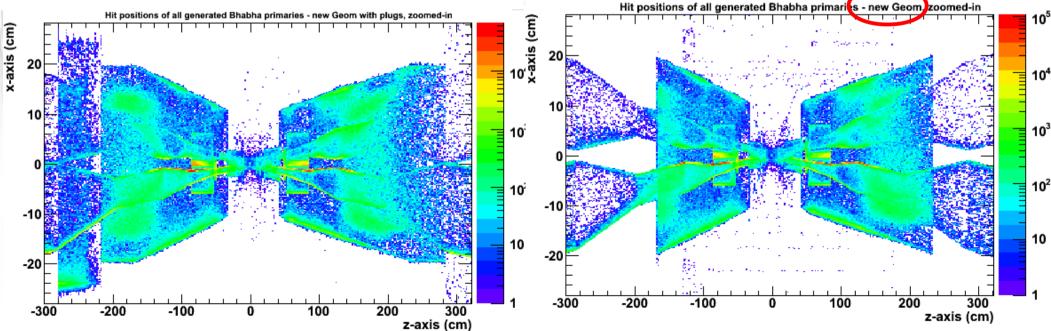
Beam pipes not modelled

Beam pipes not modelled x-axis (cm) x-axis (cm past the shield in the old geom! 10⁴ 10^{3} 10⁴ 10² -10 -20 10 Plots show all vertices where a primary = -30 outgoing Bhabha produces a daughter particle -49₀₀₀ -500 500 1000 z-axis (cm) z-axis (cm) Hit positions of all generated Bhabha primaries - new Geom, zoomed-in Hit positions of all generated Bhabha primaries - old Geom, zoomed-in 10⁴ 10⁴ 10³ 10^{2} 10² -15 300 -300-200 -300 -200 -100 100 200 300 z-axis (cm) z-axis (cm) Shield is shorter Dana Lindemann - McGill 14/03/11

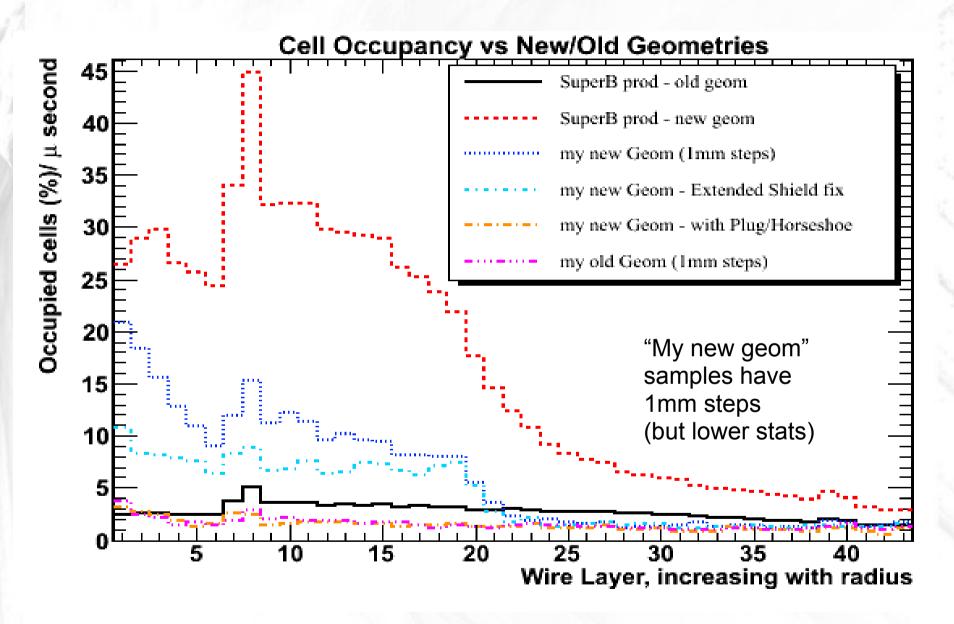
Newest Geom with Plugs Hit positions of all generated Bhabha primaries - new Geom with plugs



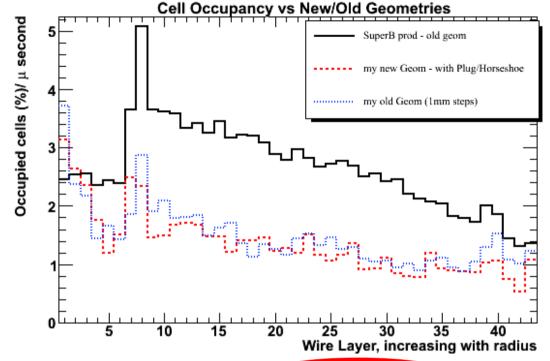
- Extended tungsten shield
- Fwd plug and Bwd Horseshoe
- New FTOF model
- Trimmed back DCH (5cm in forward region)



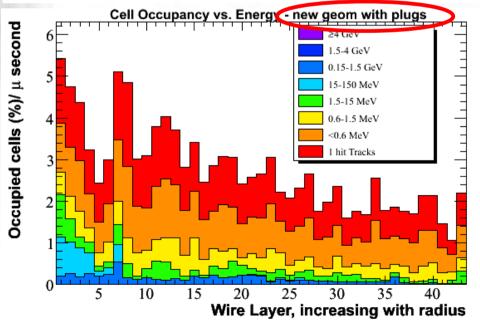
Comparison of Samples (Bruno only)

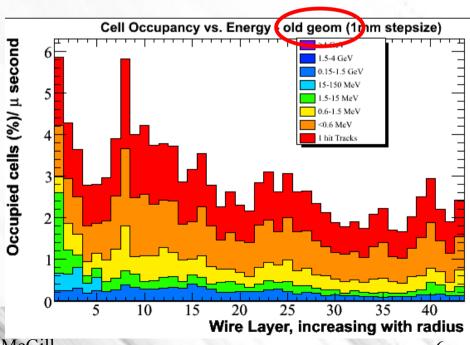


Geom vs. Energy



Note: Due to splitting plots into stacked colored "bins" in the above plots, it's possible for two tracks from the same event to double count the occupancy on a wire, resulting in falsely higher occupancies.



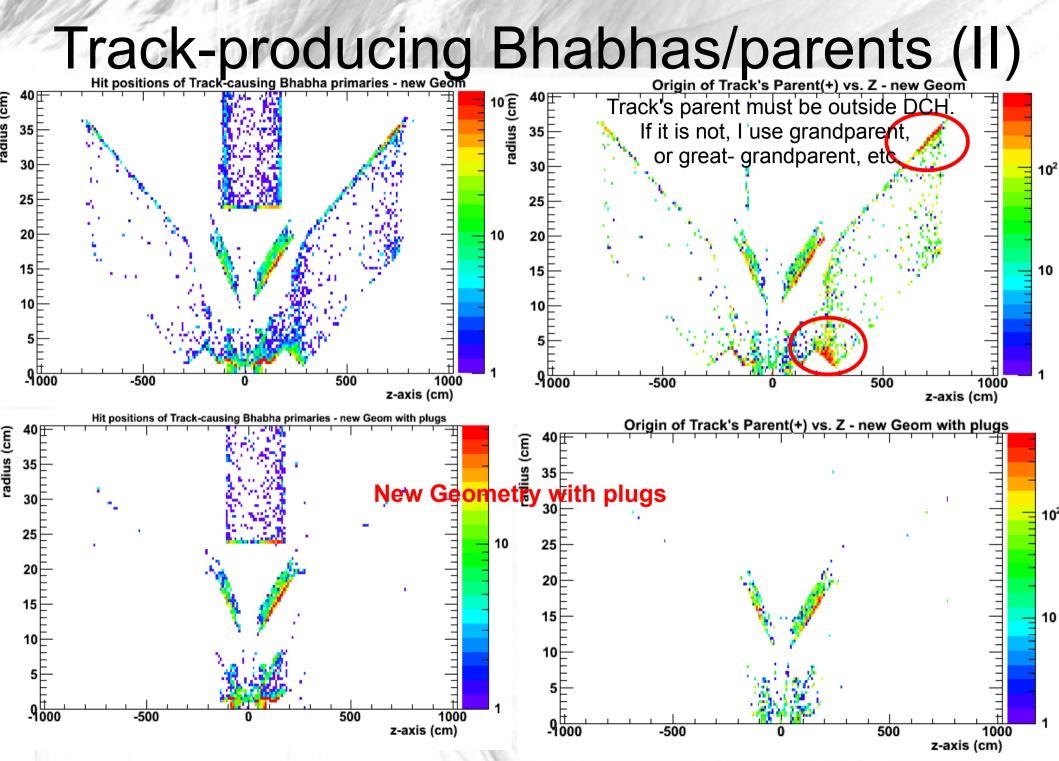


14/03/11 Dana Lindemann - McGill

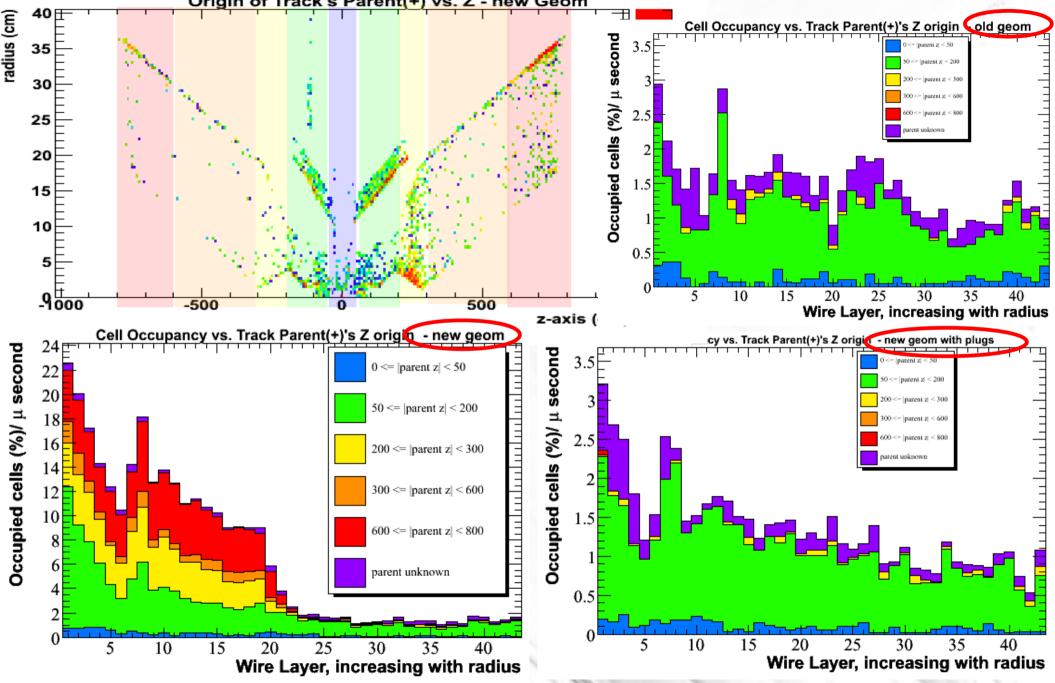
Track-causing Bhabha primaries - new Geom

Hit positions of Track-causing Bhabha primaries - new Geom

Track's parent must be outside DCH. (E) If it is not, I use grandparent, or great- grandparent, et 25 20 10 15 10 9000 -500 500 1000 -500 500 1000 z-axis (cm) z-axis (cm) Origin of Track's Parent(+) vs. Z - new Geom longer shield Hit positions of Track-causing Bhabha primaries - new Geom longer shield 10^{2} with extended shield 20 20 9000 500 -500 500 1000 z-axis (cm) z-axis (cm) Trouble area is gone with longer shield! Dana Lindemann - McGill 14/03/11



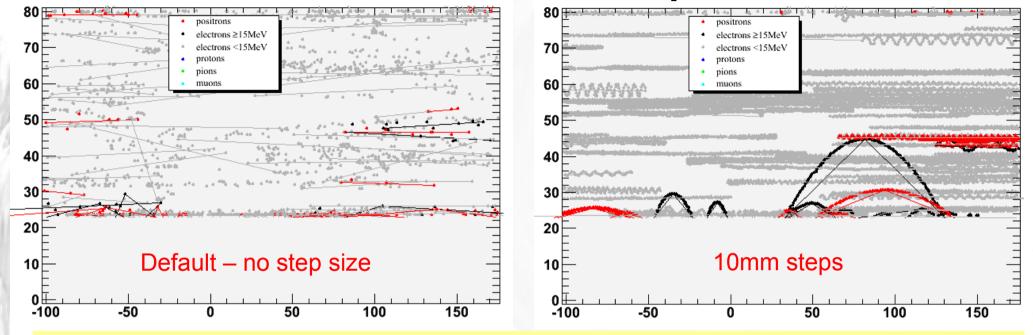
Origin of Occupancy
Origin of Track's Parent(+) vs. Z - new Geom



Conclusions

 Extended shield fix and addition of plugs/ horse shoe shielding successfully removes the occupancy increase! Back-up Slides

Visualization of Step Sizes



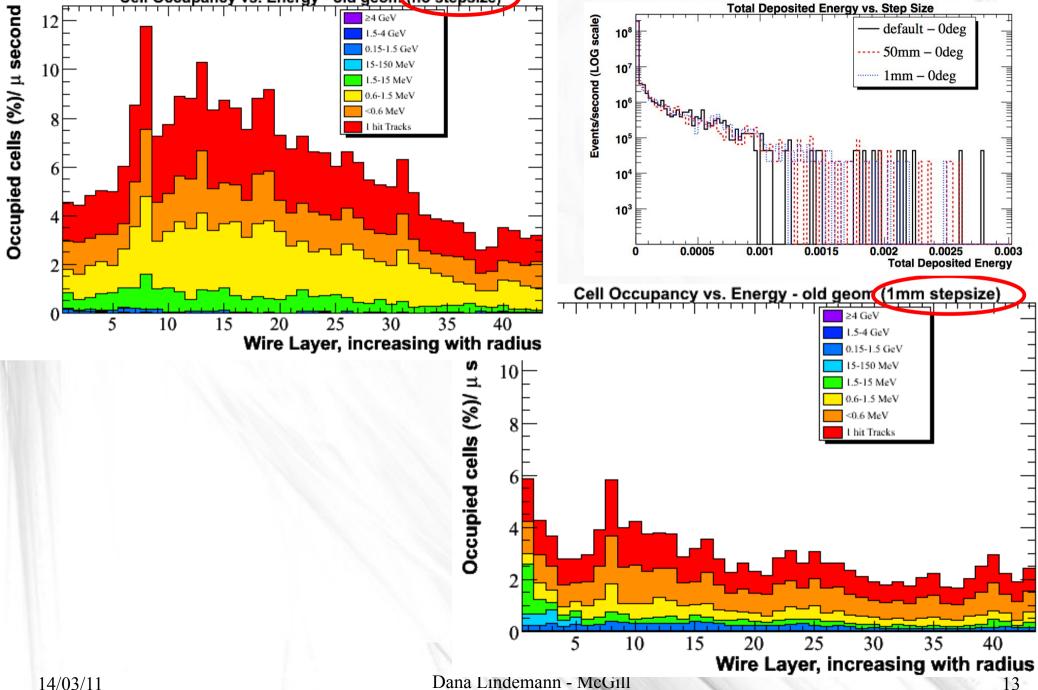
Same 200 events (>5deg) with tracks 1.5MeV < E < 150MeV, hits with deposited E > 0 only

New occupancy method:

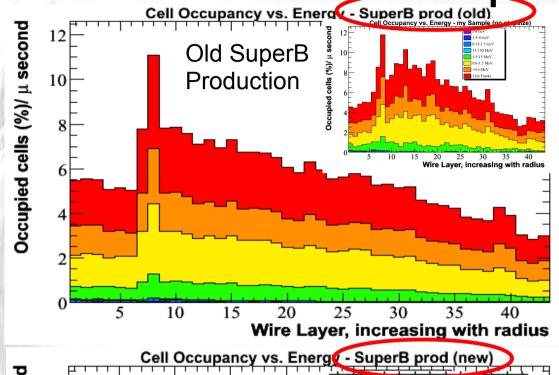
With smaller step-sizes (1mm Bruno & 10mm Bhwide), each instance of deposited energy counts as one "hit" on whichever wire is closest (axial wires only). Only one hit/wire/event is allowed.

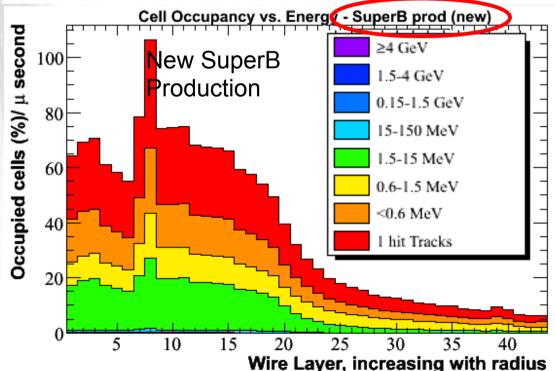
Step Size vs. Occupancy (old geom)

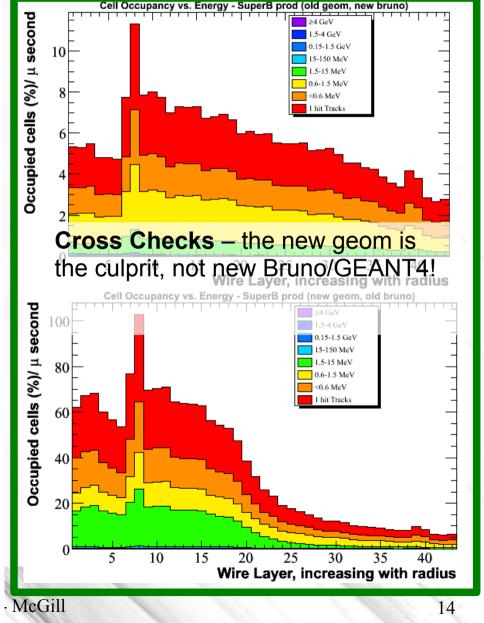
Cell Occupancy vs. Energy - old geom (no stepsize)

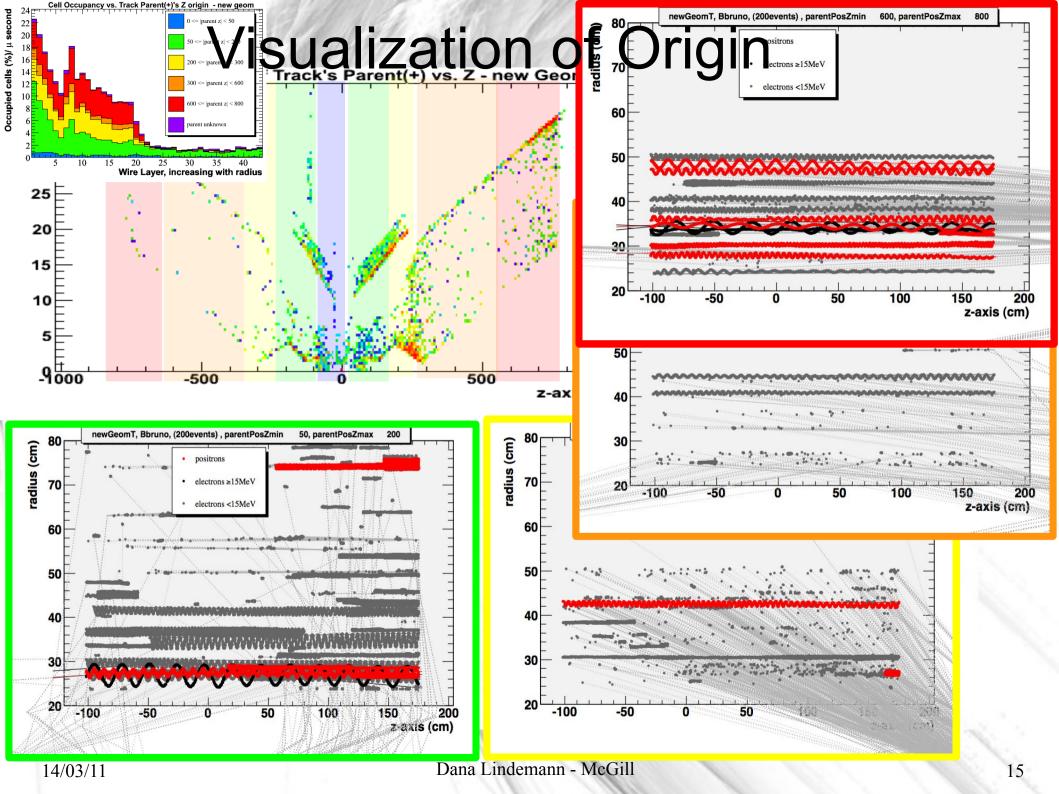


New vs. Old SuperB Productions

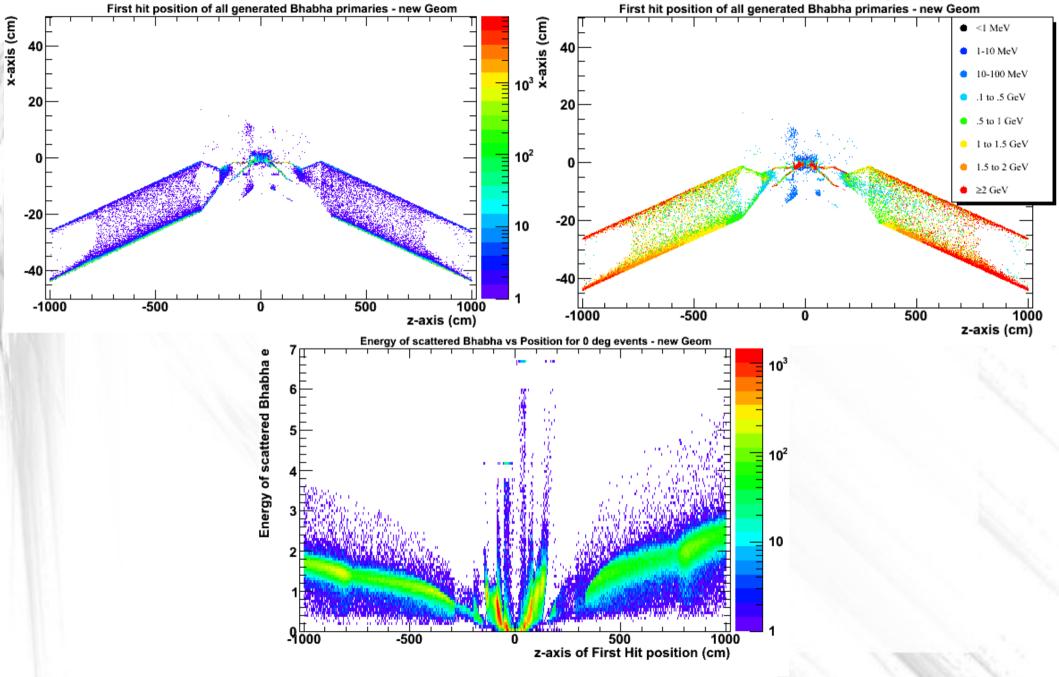








Where Bhabhas First hit the pipe



Occupancy vs. Bhabha energy

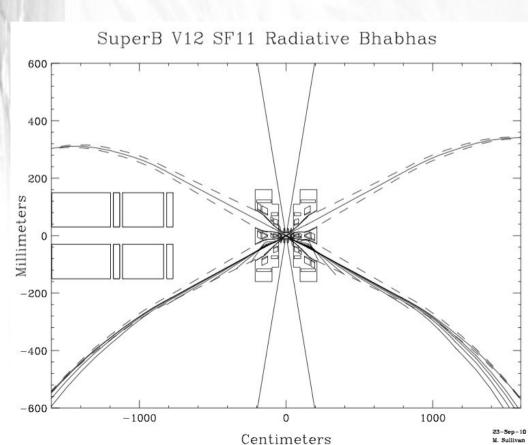
First hit position of all generated Bhabha primaries new - <1 MeV

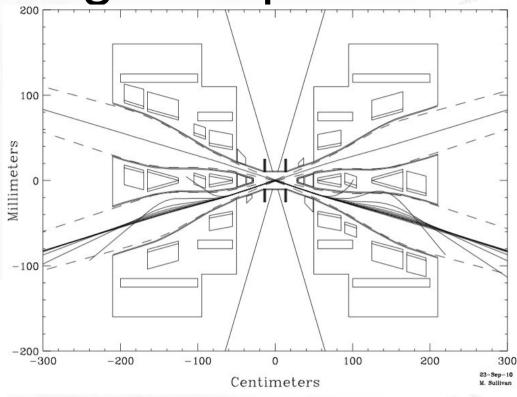
Cell Occupancy vs. primary bhabha energy Cell Occupancy vs. primary bhabha energy - old geom x-axis (cm) Occupied cells (%)/ μ second • 1-10 MeV 1-10 MeV 30 10-100 MeV 10-100 MeV I to .5 GeV .1 to 1 GeV .5-1 GeV .5-1 GeV 1-1.5 GeV 2.5 1.5-2 GeV 10 • 1-1.5 GeV ≥2 GeV • 1.5-2 GeV 0 ≥2 GeV -10 -20 -30 -4<u>9</u>00 -600 -400 -200 200 400 600 800 30 z-axis (cm) Wire Layer, increasing with radius Cell Occupancy vs. primary bhabha energy - new geom Cell Occupancy vs. primary bhabha energy - new geom with plugs Occupied cells (%)/ μ second <1 MeV second 20 $1-10~{
m MeV}$ 1-10 MeV 10-100 MeV 18 10-100 MeV .l to .5 GeV .5-1 GeV 16 I to .5 GeV <u>%</u> 1-1.5 GeV 1.5-2 GeV 5-1 GeV 14 ≥2 GeV cells 1-1.5 GeV 12 1.5-2 GeV 10 Occupied €.51 ≥2 GeV 8 0.5 15 20 30 35 40 20 25 35 40 10 15 30 10 Wire Layer, increasing with radius Wire Layer, increasing with radius

Mike Sullivan's Magbend plots

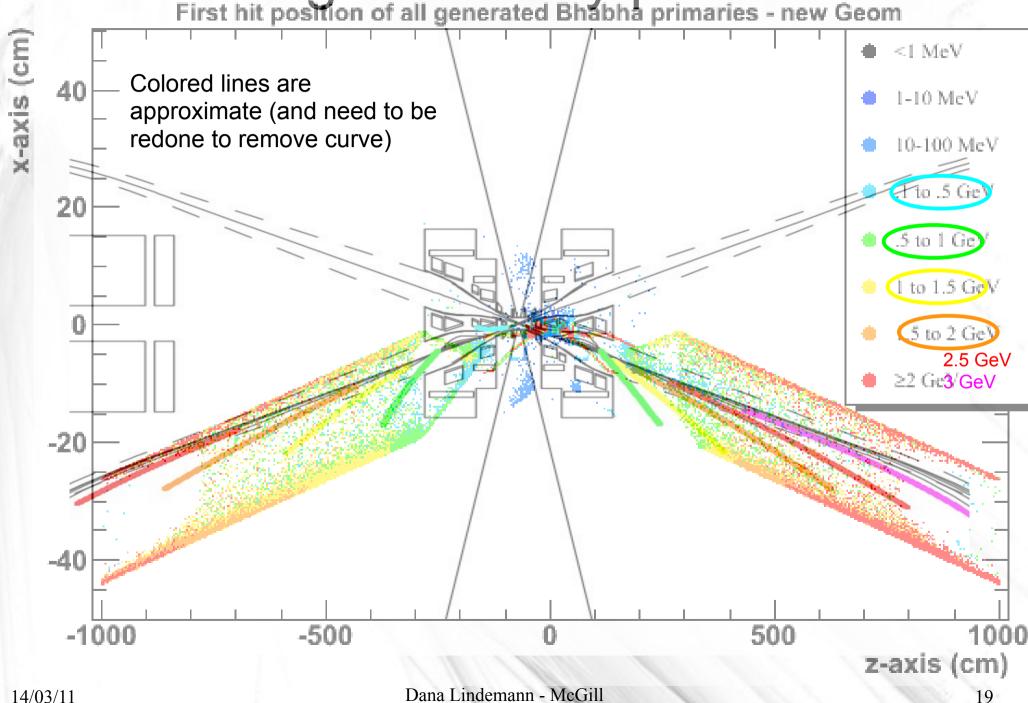
iann - McGill

Plot show 0.5-4 GeV in 0.5 increments

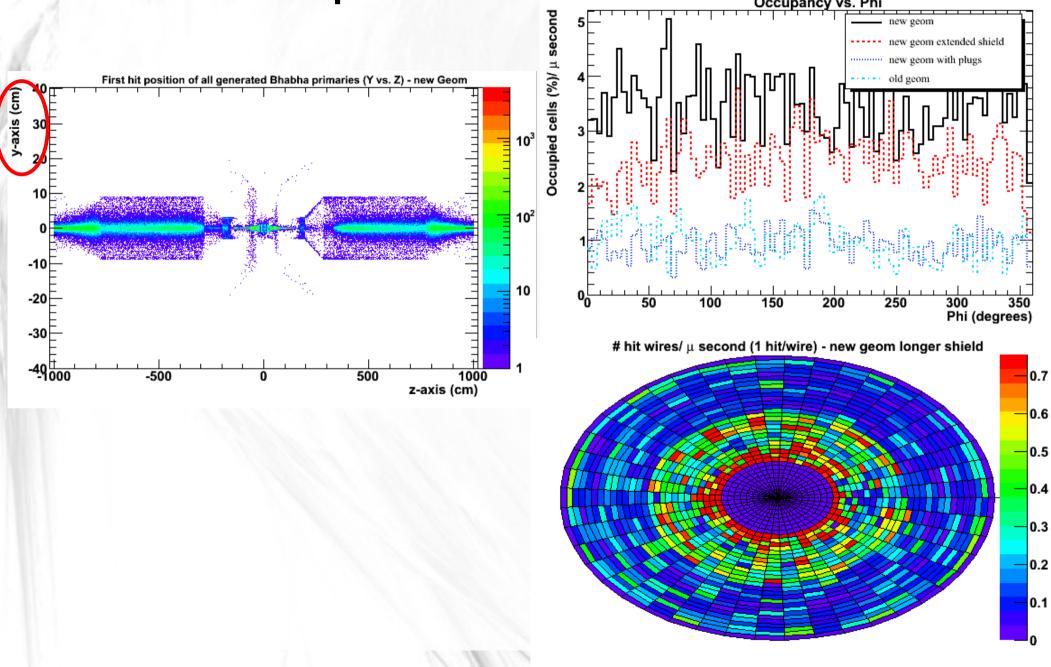




Magbend + My plots First hit position of all generated Bhabha primaries - new Geom



Dependence on Phi
Occupancy vs. Phi



Question about Angle

- FastSim is using 33mrad crossing angle
- I believe FullSim is using 30mrads. Can this be confirmed?

