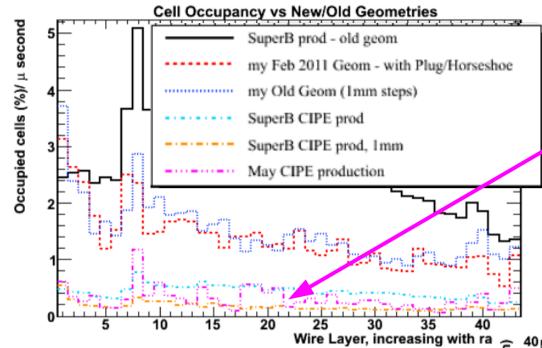
SuperB: DCH background studies with FullSim

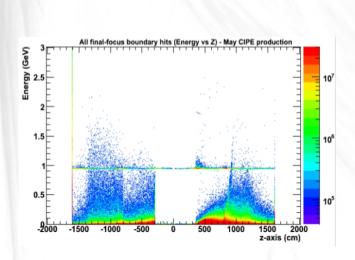


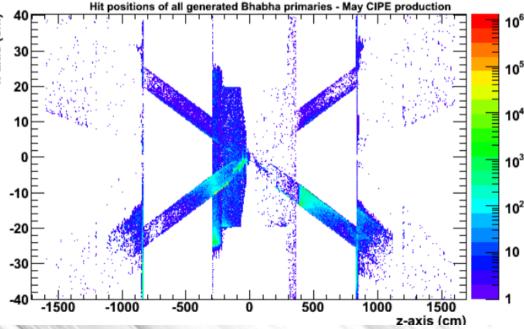
Dana Lindemann - McGill University
SuperB Backgrounds Meeting
May 30, 2011

Bug in CIPE v1



Production from earlier in May – CIPE v2 but before bug fix, and likely same bug as in Frascati...





Elbays. Pre-Frascati ("new geom") W/ Plugs Hit positions of all generated Bhabha primaries - new Geom with plugs Hit positions of all generated Bhabha primaries - new Geom with plugs Hit positions of all generated Bhabha primaries - Elba (CIPEv2) production 10 -10 -20 -30 -1500 500 1000 Pre-Frascati (Feb2011) Geometry With plugs 10⁴ 10³ 10² 10² 10

-200

-100

100

200

300

z-axis (cm)

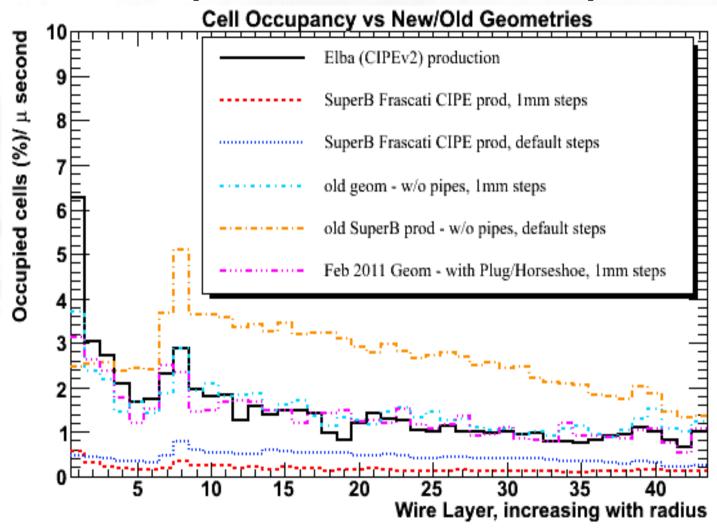
-200

-100

300

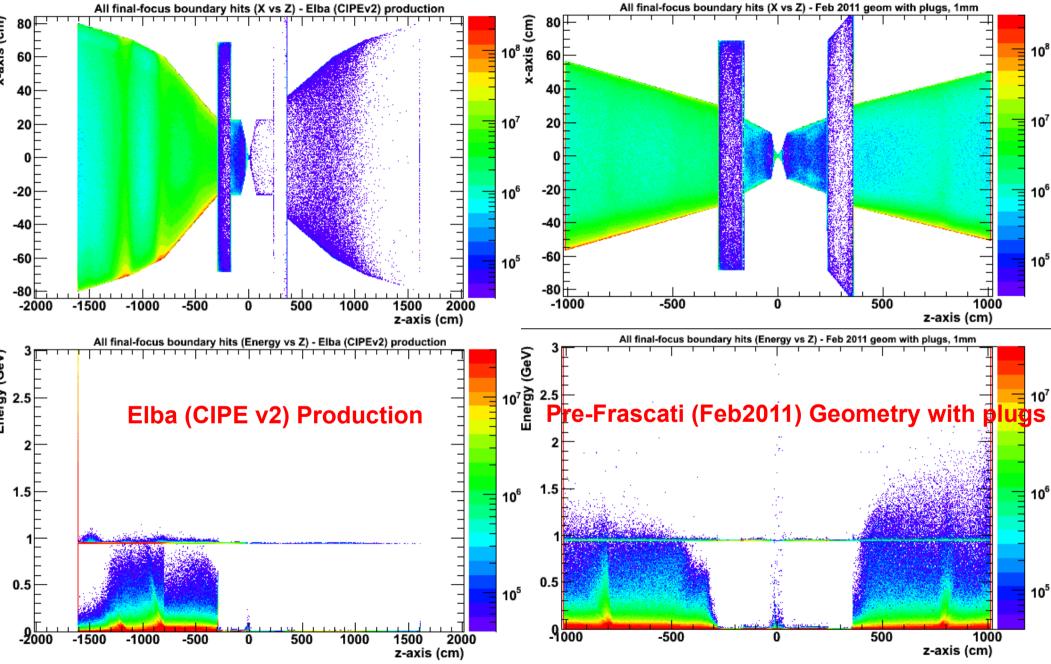
z-axis (cm)

Comparison of Samples

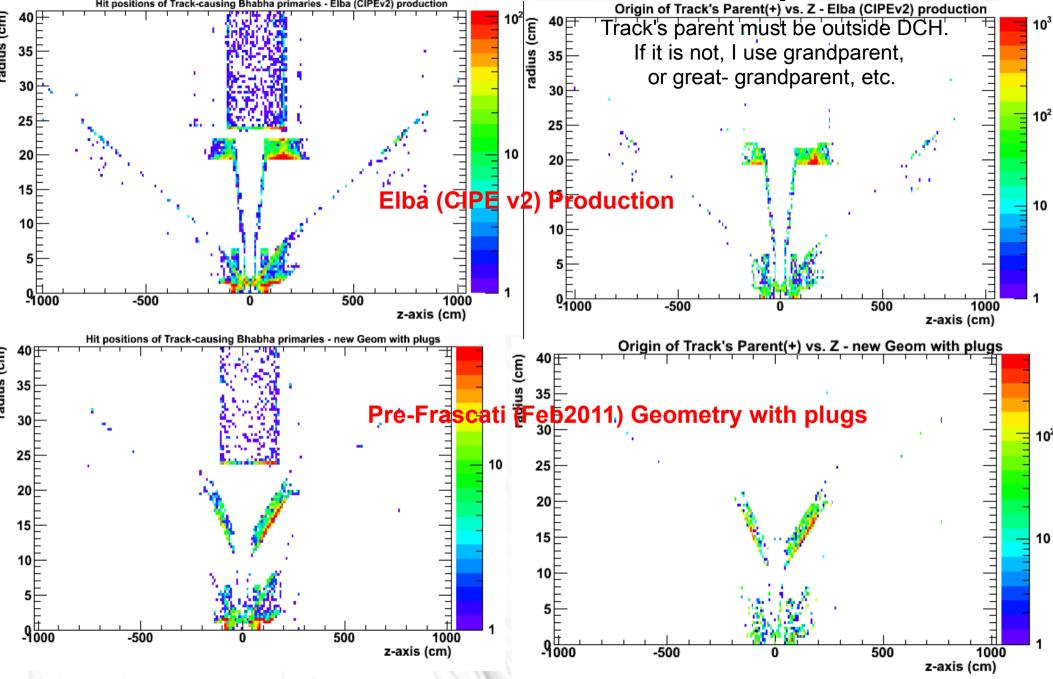


Rise in occupancy likely due to a fix of the bug that caused tracks to get stuck in the final-focus

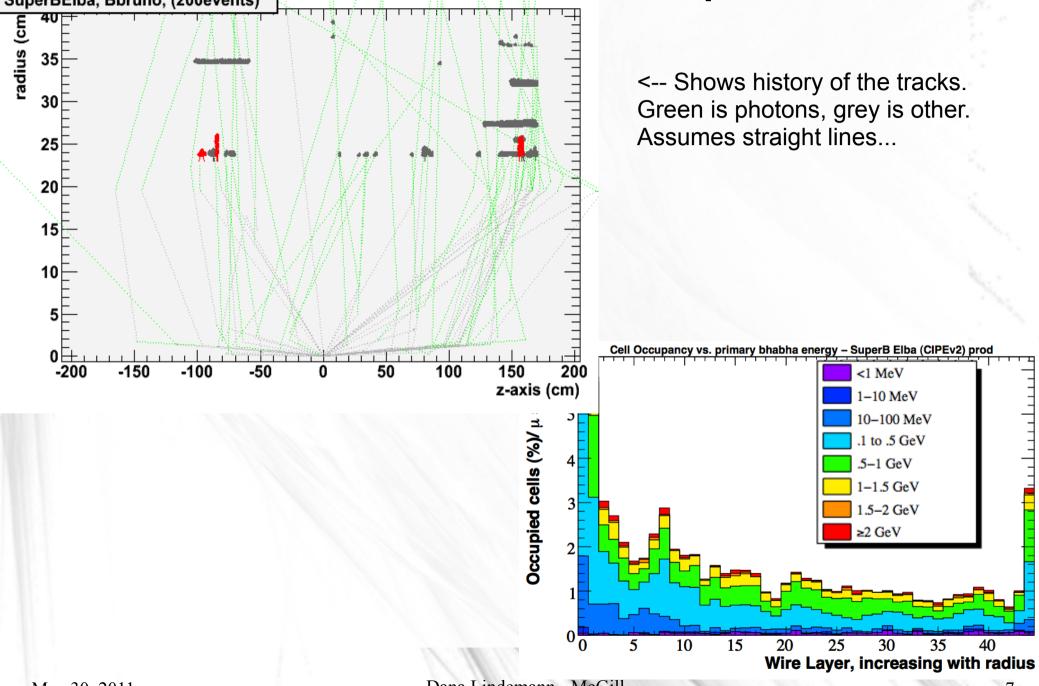
ALL final-focus boundary hits



Track-producing Bhabhas/parents



More Info on Hotspot



Where Bhabhas First hit the pipe First hit position of all generated Bhabha primaries - new Geom Cell Occupancy vs. primary bhabha energy (-axis (cm <1 MeV 1-10 MeV 10-100 MeV .1 to .5 GeV 20 .5 to 1 GeV 1 to 1.5 GeV 1.5 to 2 GeV ≥2 GeV -10 -15 -400 -200 200 400 -1000 -500 500 1000 z-axis (cm) z-axis (cm) Energy of scattered Bhabha vs Position for 0 deg events - new Geom Energy of scattered Bhabha vs Position - Elba (CIPEv2) production Pre-Frascati (Feb2011) Geometry with plugs 10³ Elba (CIPE v2) Production 10² 10 9000 500 1000 1500 z-axis of First Hit position (cm) z-axis of First Hit position (cm) Dana Lindemann - McGIII

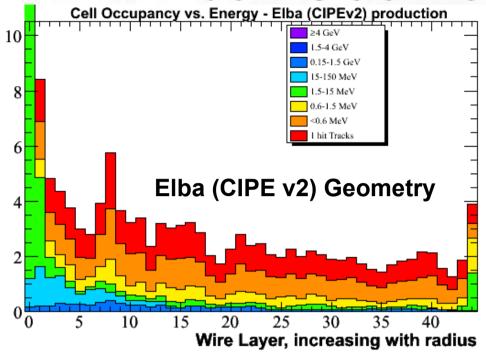
May 30, 2011

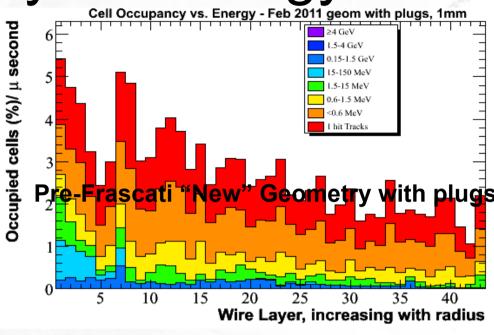
Conclusions

- New Final Focus design shows increase in occupancy back to levels pre-Frascati.
 - But never had Truth info for Frascati samples so best guess is that there was a bug in the production...

Back-up Slides

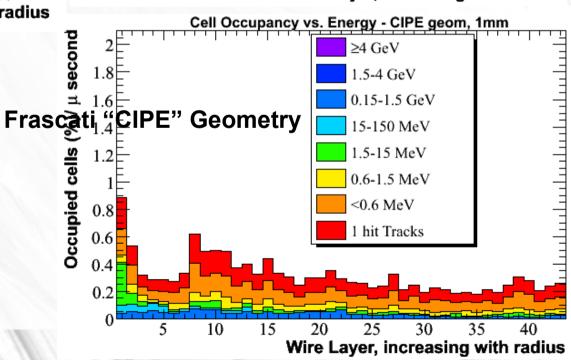
"Elba" Geometry vs. Energy





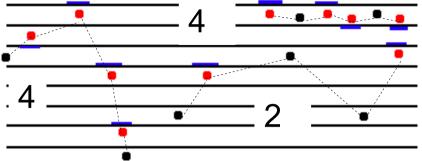
Note: By splitting plots into stacked colored "bins", falsely higher occupancies are shown.

Wire layer 0 and 44 are actually the DCH boundaries, not wires.



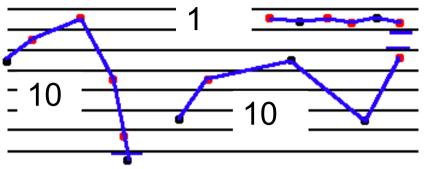
Occupied cells (%)/ μ second

Occupancy Algorithm



Deposited Energy w/o double-counting:

- •1 wire-hit for each hit with deposited E >0
- Uses whichever wire is closest to hit (accounting for phi arrangement)
- •Allows only 1 wire-hit per wire per event.
- Does NOT account for stereo wires
- Current "bug": if hit is closer to boundary than first or last wires, does not count in occupancy
- Doesn't work as well for larger step sizes
- My Bruno occupancies are normalized to ~215 Mhz
- Wire layout is same as Riccardo uses: First superlayer has smaller cell radii



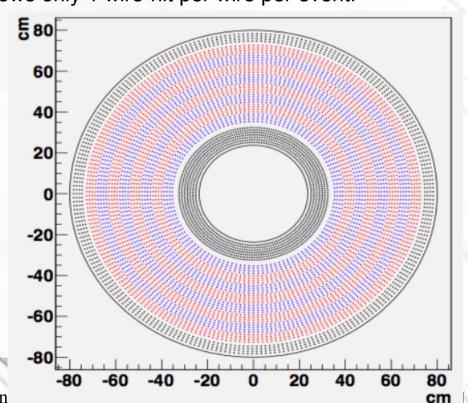
Hit-by-Hit w/o d-c : old method, not used anymore!

Straight lines between ALL hits

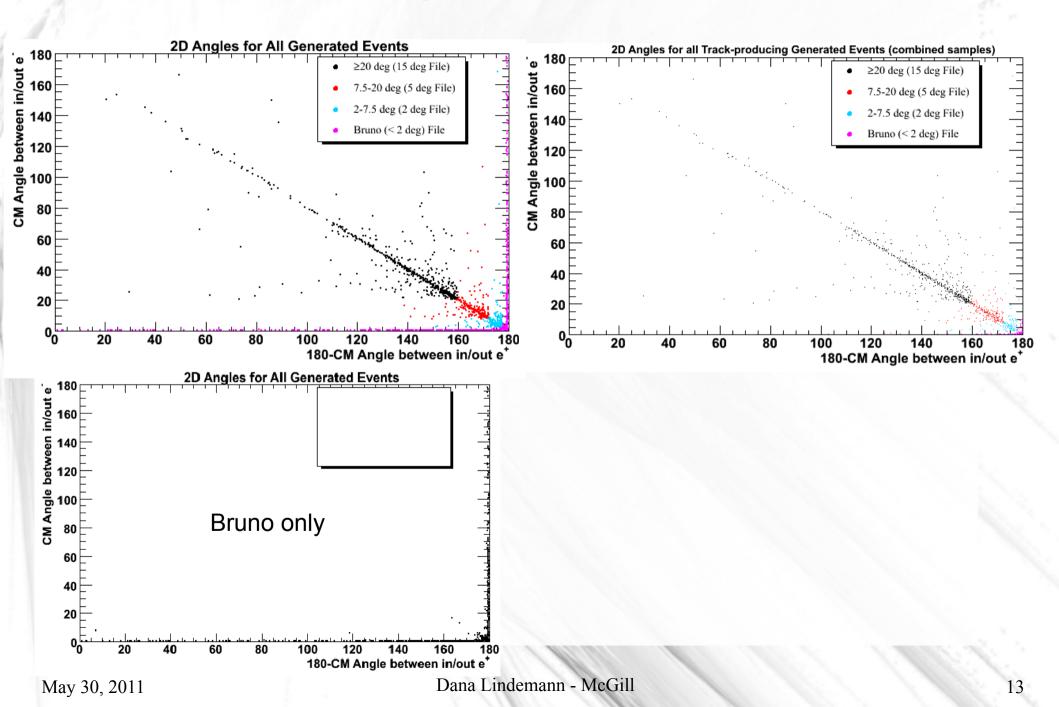
1 wire-hit per crossed wire

If no crossed wires, wire closest to first hit.

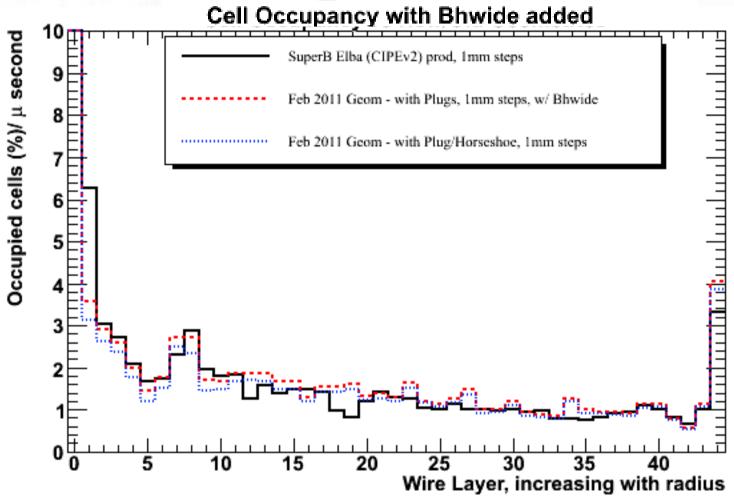
Allows only 1 wire-hit per wire per event.



Combining Bruno + Bhwide



Adding in Bhwide



- I couldn't get the CIPEv2 geometry to run, so used next-best geometry...
- Wire 0 (44) represent hits closer to inner (outer) boundary than first (last) wire.
 (Wire 0 values are 25.0, 22.4, and 21.3% respectively).
 Hopefully guard wires will prevent these events from reaching wires?

Parent's Z origin vs. Occupancy Cell Occupancy vs. Track Parent(+)'s Z origin - Elba (CIPEv2) production Origin of Track's Parent(+) vs. Z - Elba (CIPEv2) production Occupied cells (%)/ μ second adius (cm) 10 $0 \le |parent z| \le 50$ $50 \le |parent z| \le 200$ $200 \le |parent z| \le 300$ $300 \le |parent z| \le 600$ 10² $600 \le |parent z| \le 800$ $800 \le |parent z|$ parent unknown 10 Elba (CIPE 2) Production ⁰1000 -500 1000 500 25 30 35 40 10 15 z-axis (cm) Wire Layer, increasing with radius Origin of Track's Parent(+) vs. Z - new Geom with plugs Cell Occupancy vs. Track Parent(+)'s Z origin - new geom with plugs Occupied cells (%)/ μ second parent zi < 200 10² 2.5 25 Pre-Frascati (Feb2011) Geometry with plugs 10 15 0.5 9000 1000 -500 500 10 30 z-axis (cm) Wire Layer, increasing with radius Dana Linuemann - McGill 15

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