

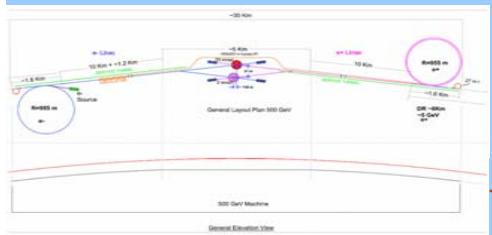
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Study of SiPMs Detection Signal Uniformity Across Various Scintillator Tiles

Keith Drake, Tera Dunn, Jack Gill,
Maria Person Gulda, Uriel Nauenberg, Gleb Oleinik,
Joseph Proulx, Elliot Smith, Paul Steinbrecher,
Jonathan Varkovitzky



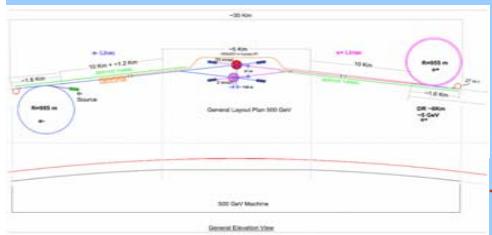
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We measured the pulse height performance of various SiPMs; from CPTA, Hamamatsu

We measured the pulse height due to a beta emitter radioactive source located in various positions on a tile. The SiPM is located at the center of the tile touching the face of the tile.



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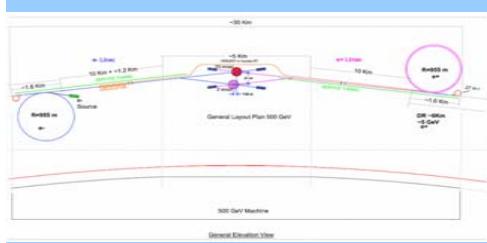
The cast tile is 5 x 5 x 1.0 cm³.

The scintillator tile surface is polished and covered with Radiant Mirror reflecting paper.

The extruded tile is 5 x 5 x 1.0 cm³.

The scintillator tile surface is not polished but is covered with Radiant Mirror reflecting paper.

We also considered the case where the edges of the tile is painted with reflective paint.



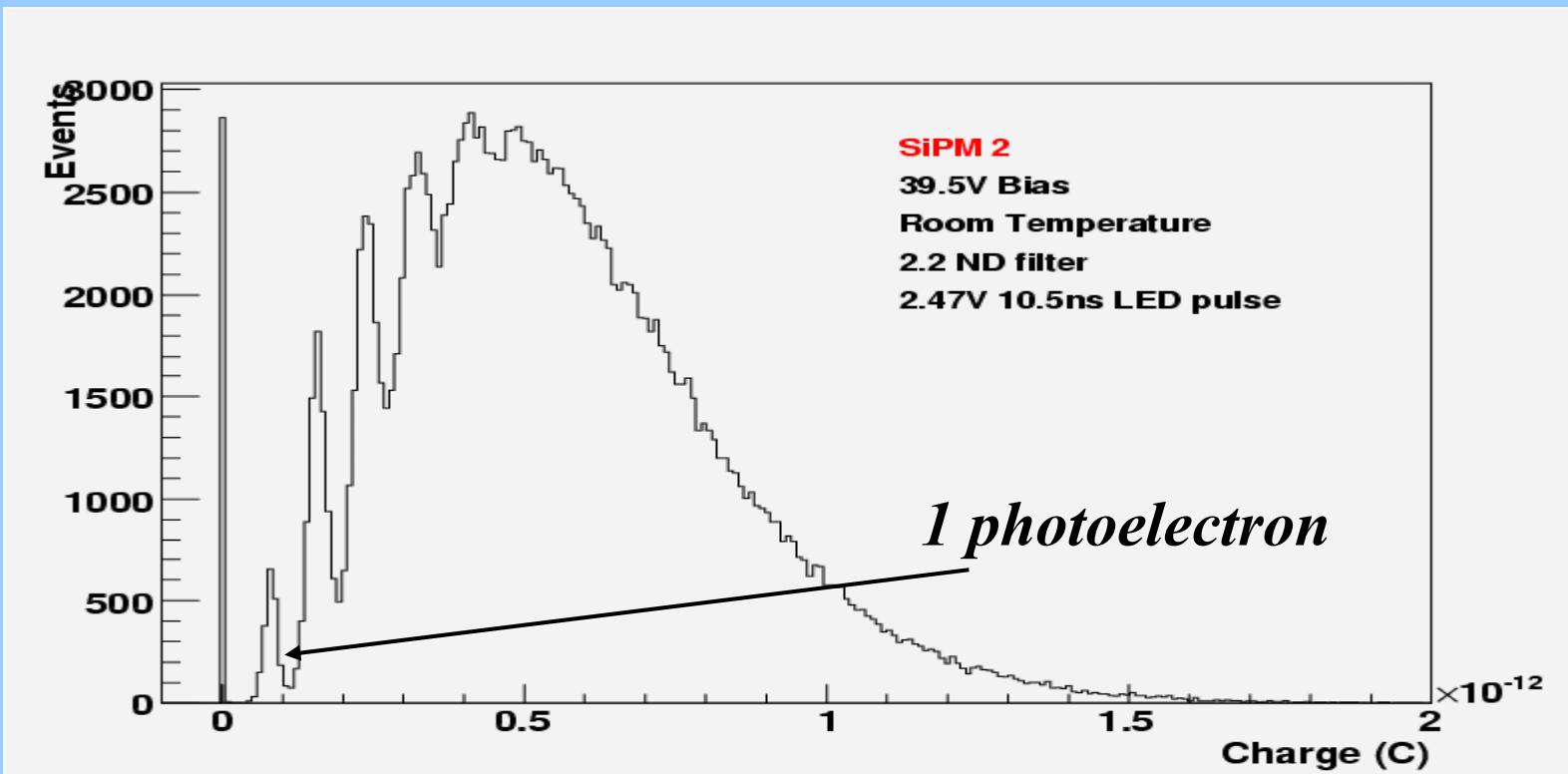
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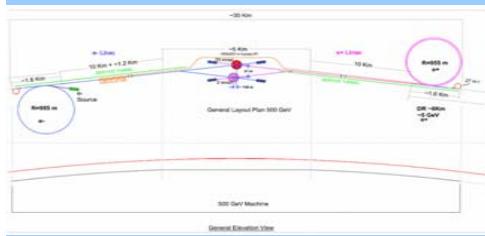
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Measurement of CPTA SiPMs

Used light from a photo diode + nd filter



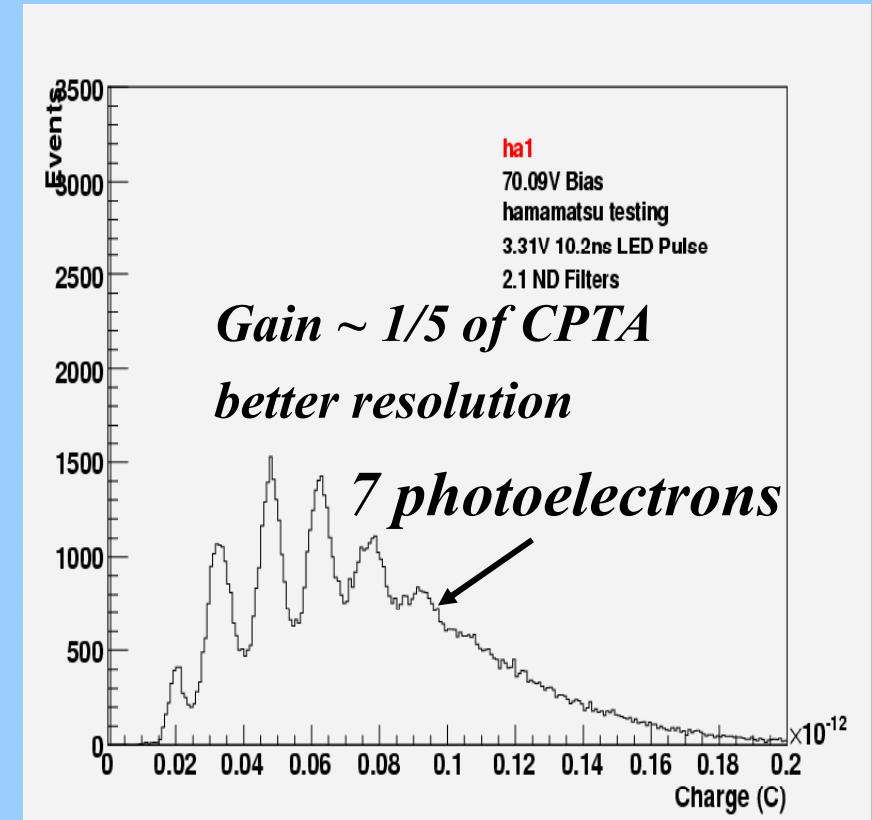
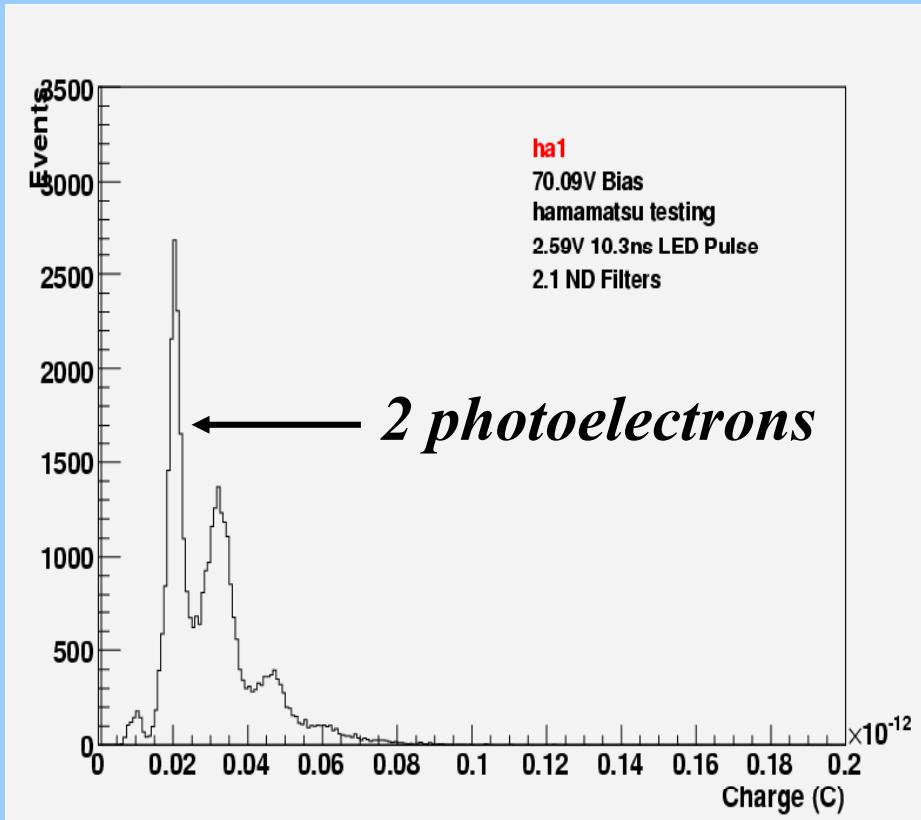


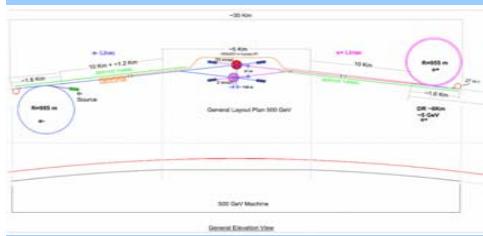
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Measurement of Hamamatsu SiPMs



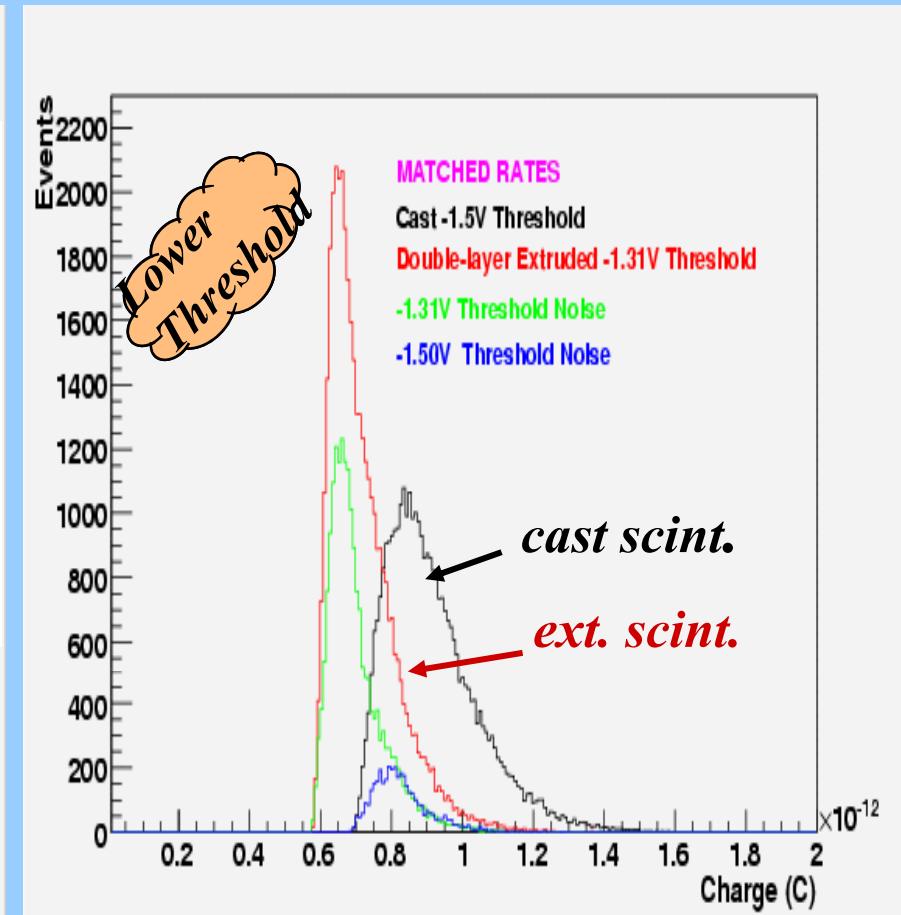
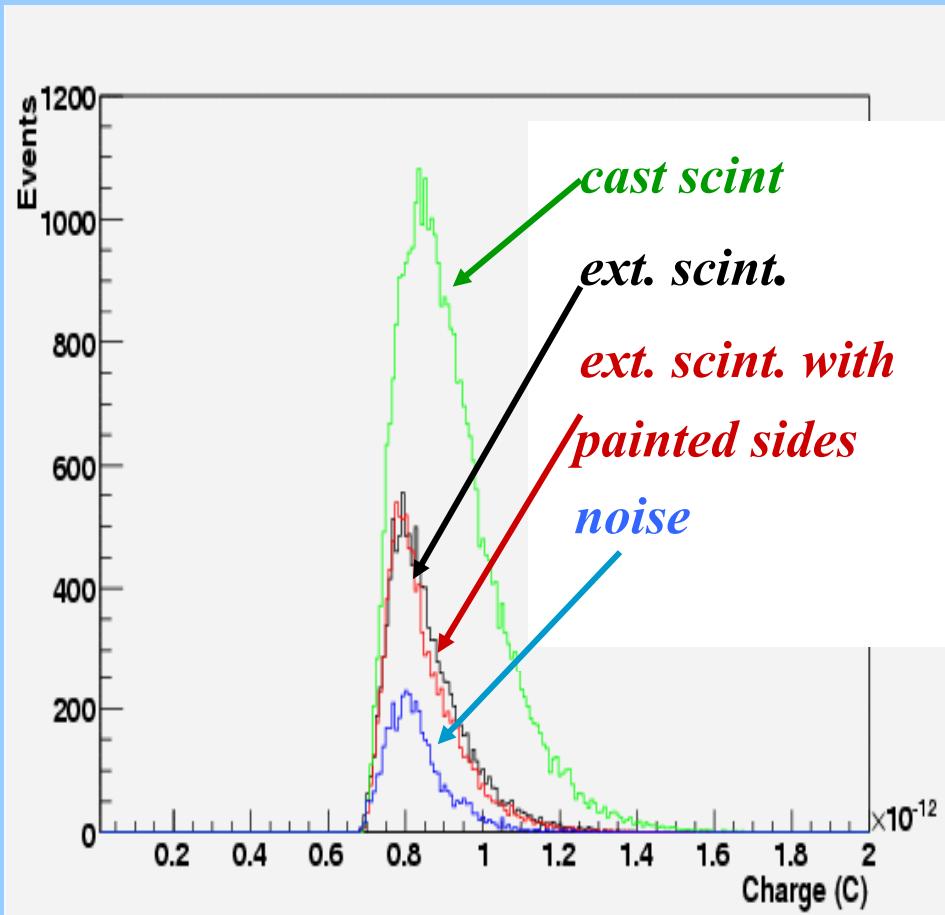


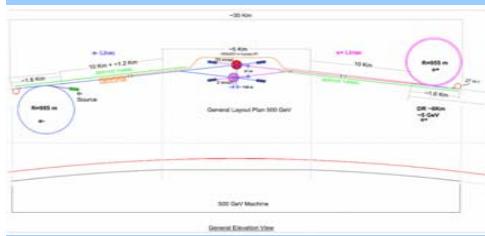
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Signal Comparisons, Same Time Intervals





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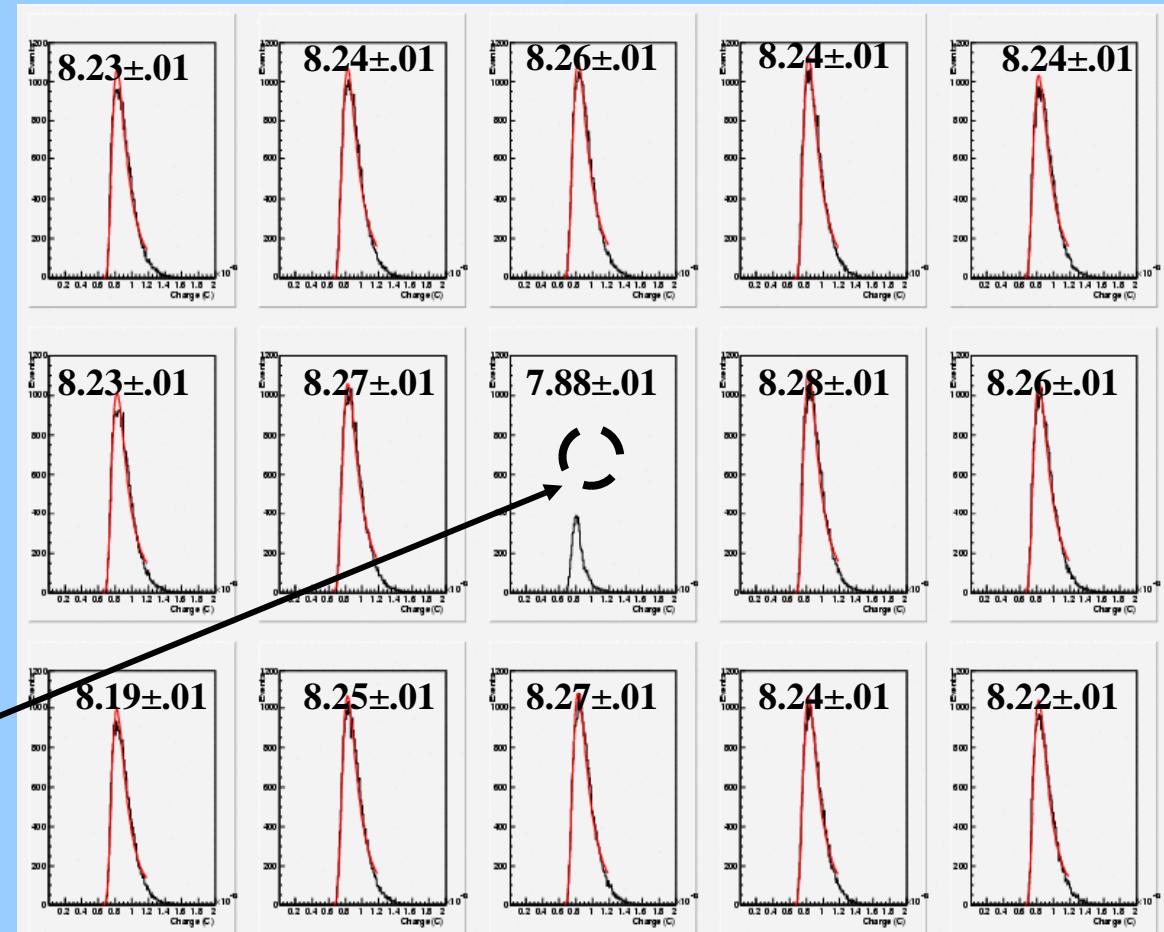
*Cast Scintillator
Tile 5x5x1.0 cm³*

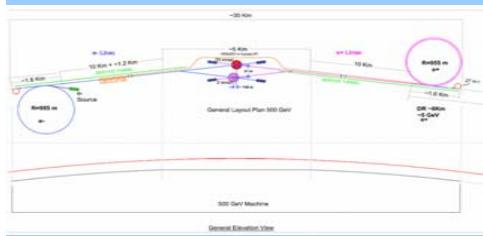
*wrapped in Radiant
Mirror paper*

*Radioactive $^{38}\text{Sr}^{90}$ Source
Located in 15 positions*



In 10^{-13} Coul.





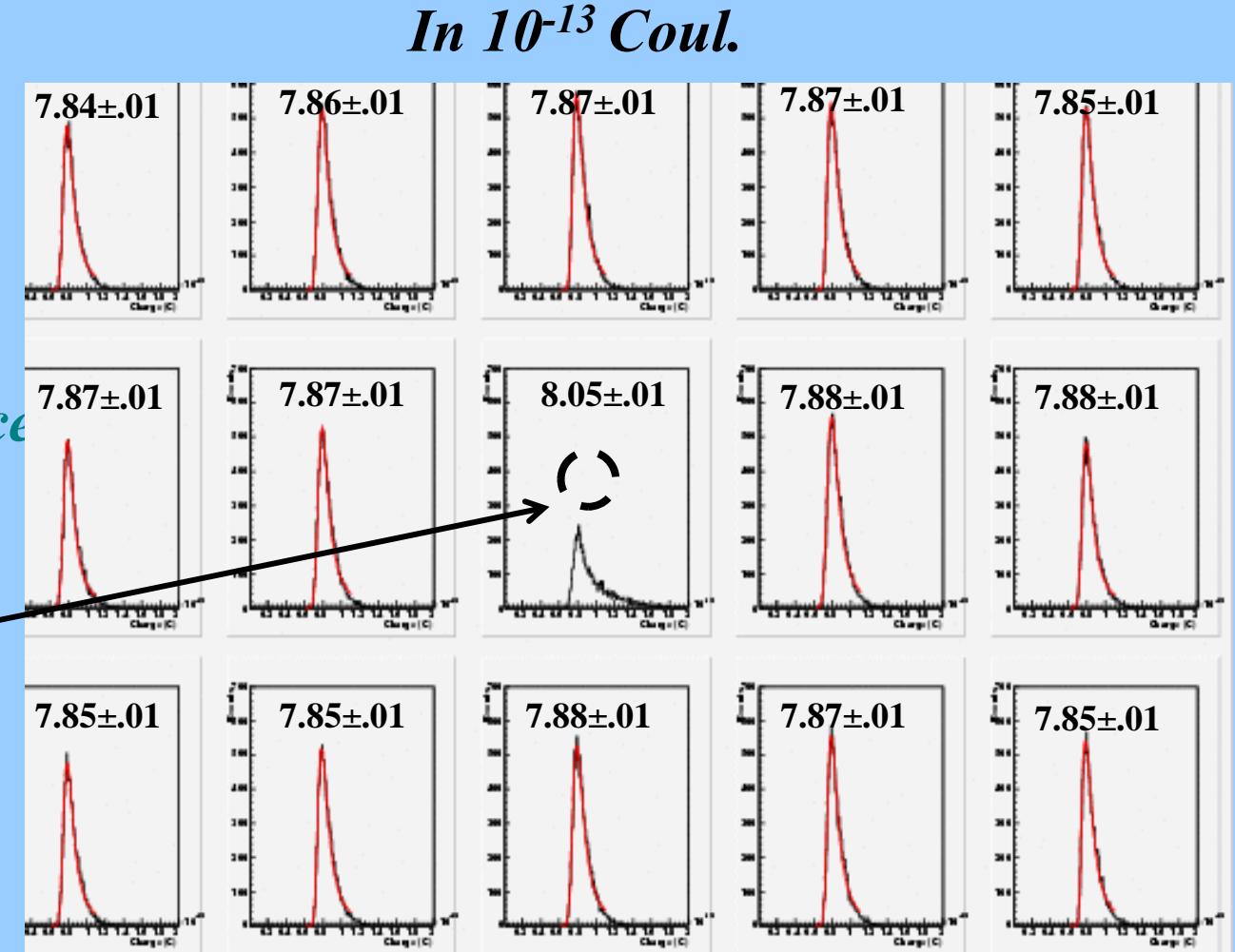
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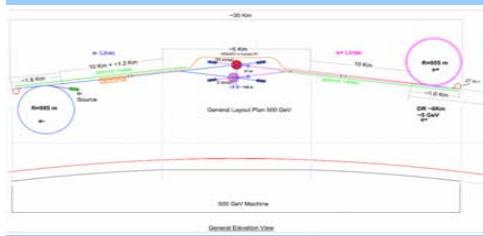
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*Extruded scintillator
Tile 5 x 5 x 1.0 cm³*

*wrapped in Radiant
Mirror paper
radioactive $^{38}\text{Sr}^{90}$ source
located in 15 positions*





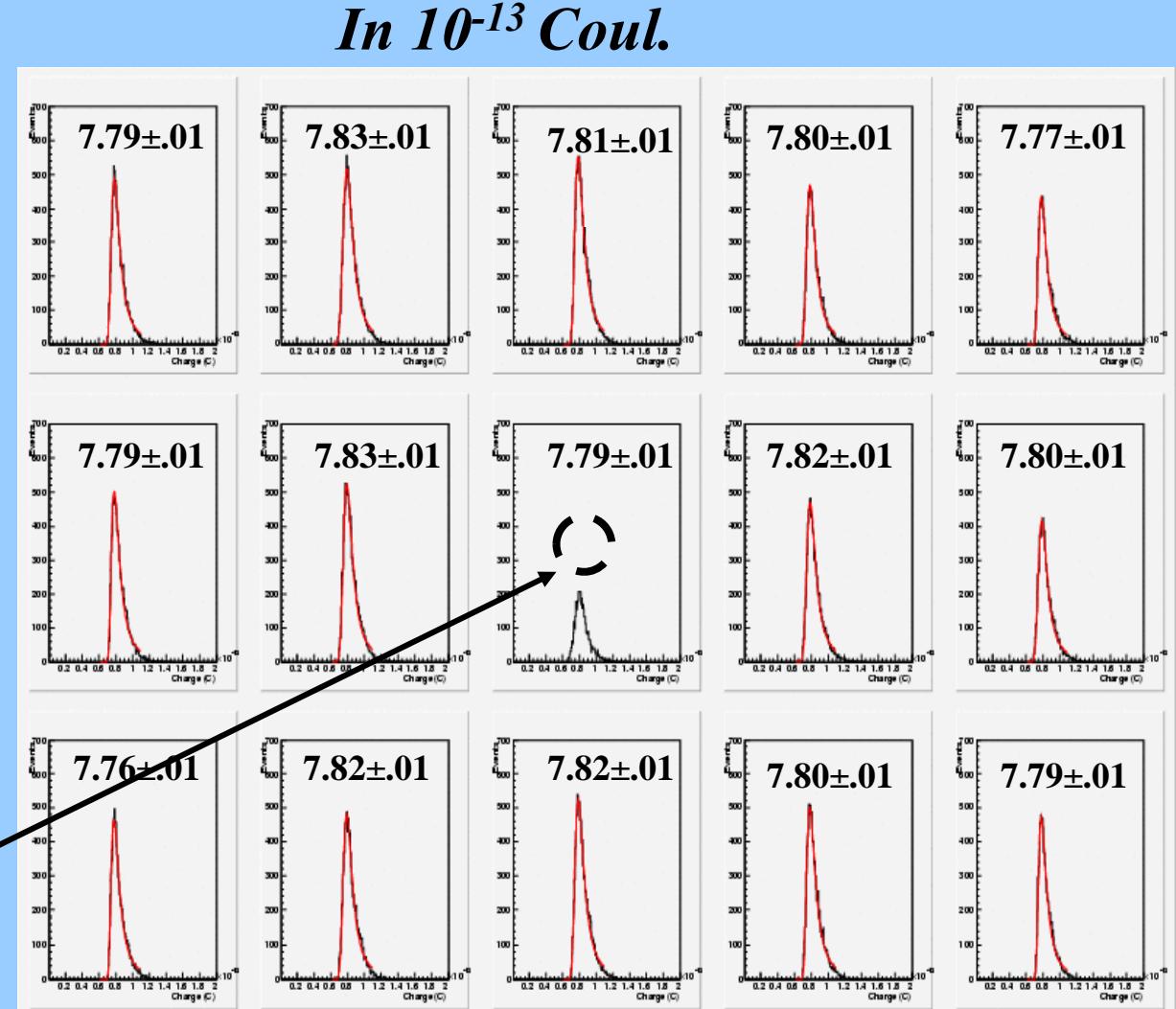
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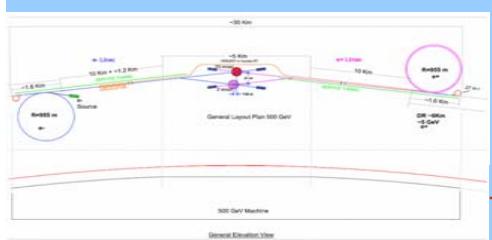
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*Extruded scintillator
with painted sides
Tile 5 x 5 x 1.0 cm³*

*wrapped in Radiant
Mirror paper
radioactive $^{38}\text{Sr}^{90}$ source
located in 15 positions*



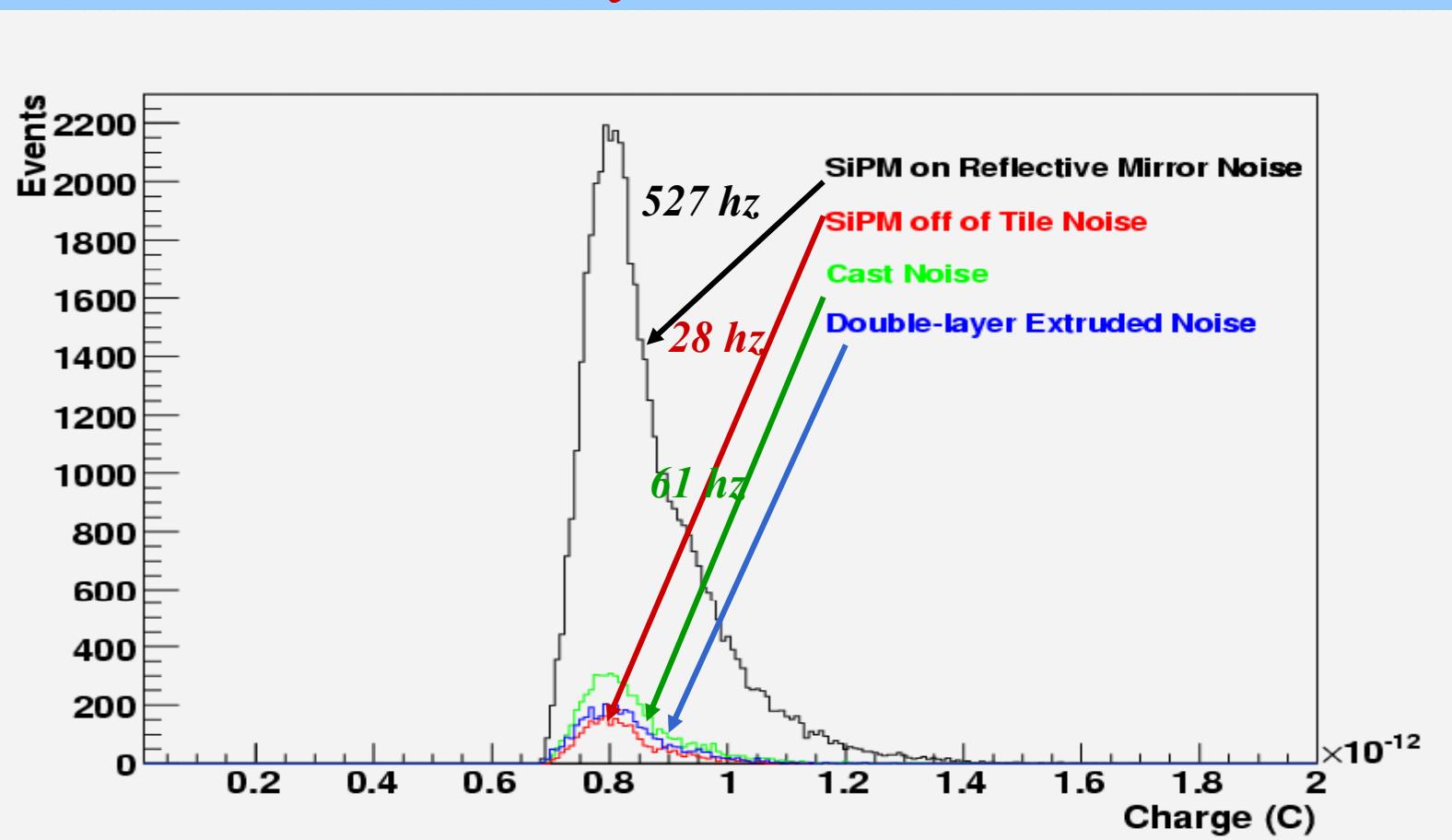


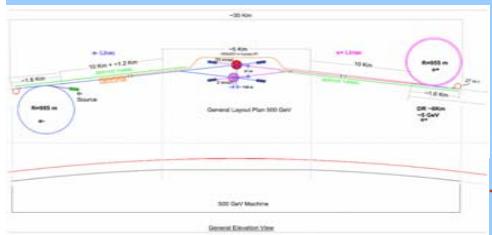
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An Oddity on Noise Rates





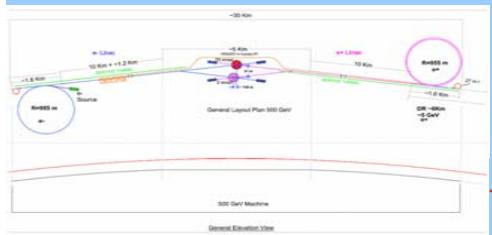
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Future Measurements

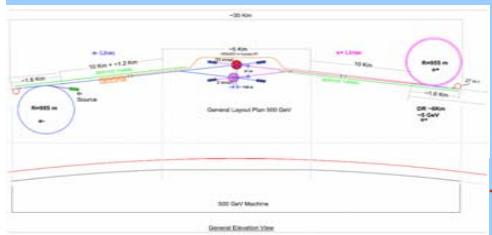
- *Have 2x2 mm² units from CPTA to test*
- *Additional 1x1 mm² units from Hamamatsu and CPTA*
- *Additional extruded tiles to check for uniformity*



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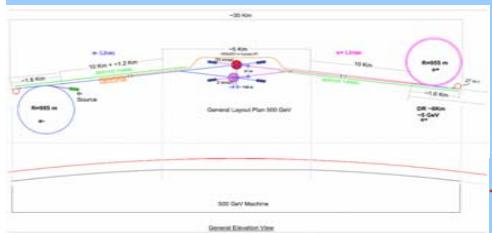




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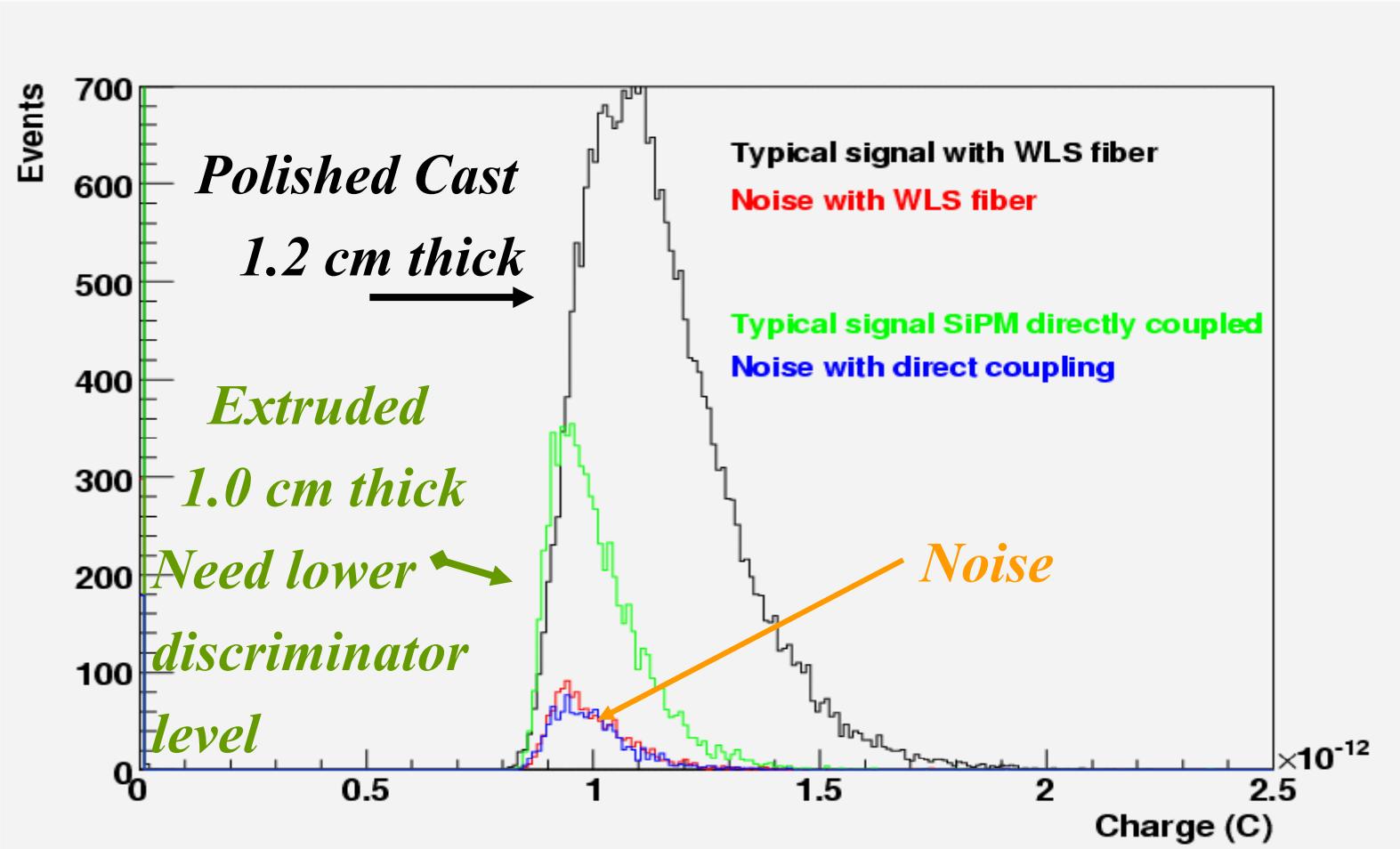


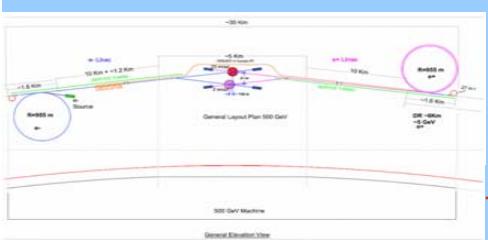
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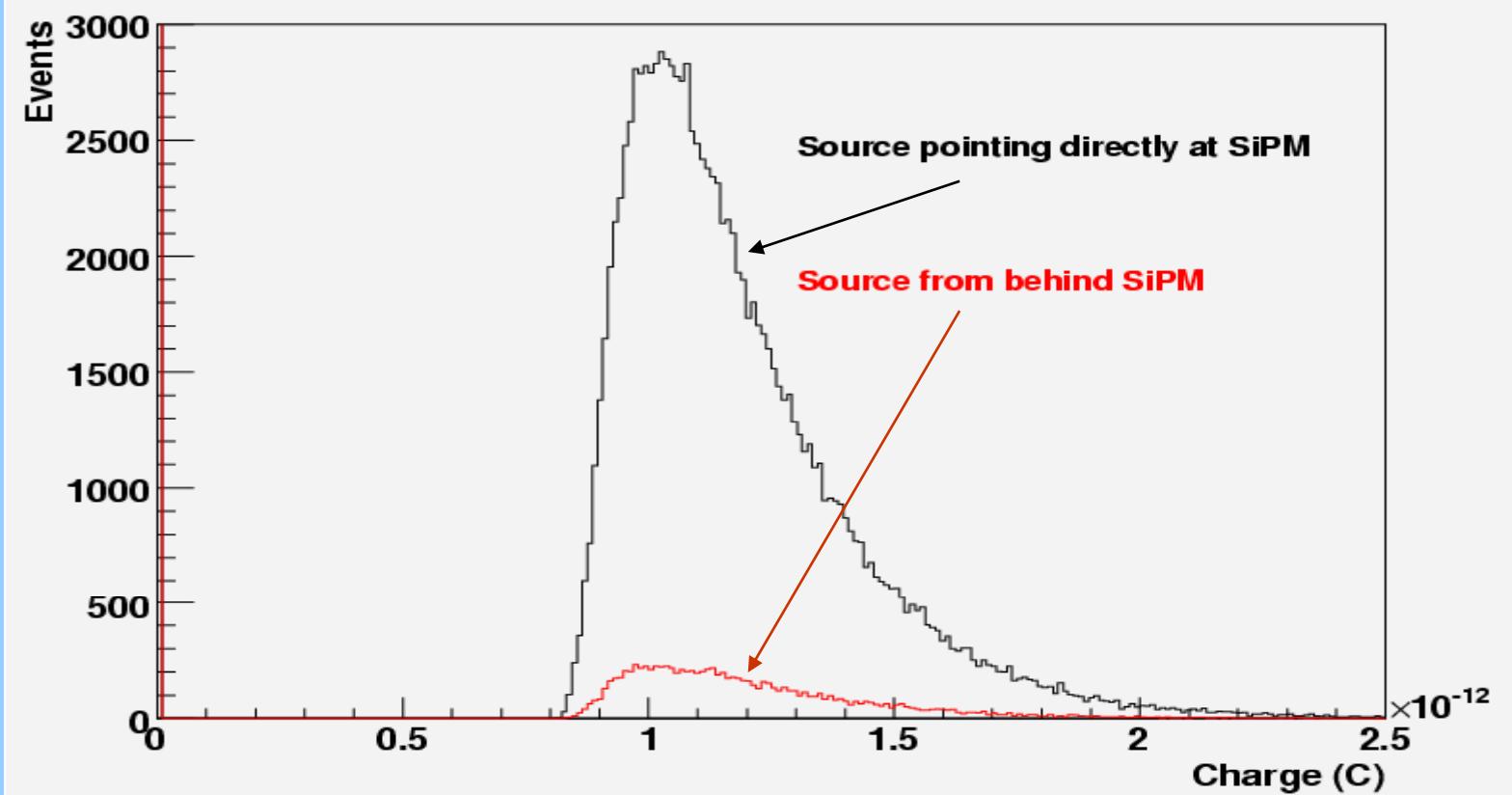
Signal Comparisons, Same Time Intervals

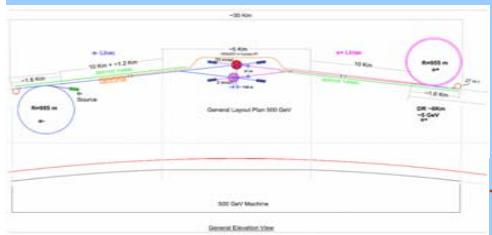




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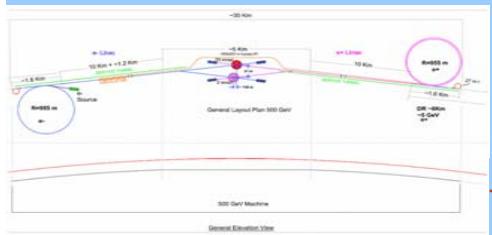




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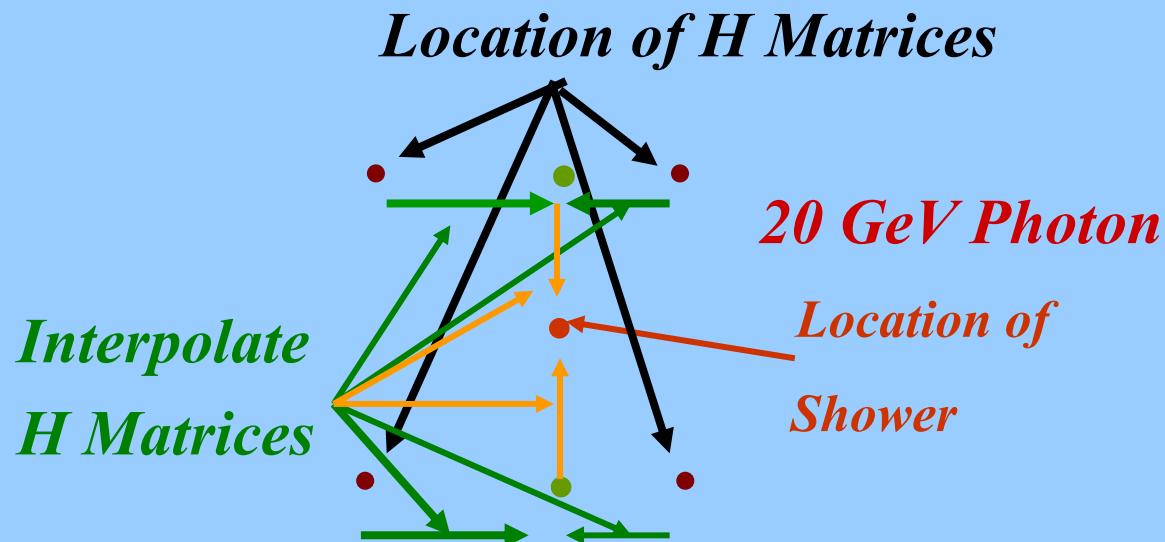


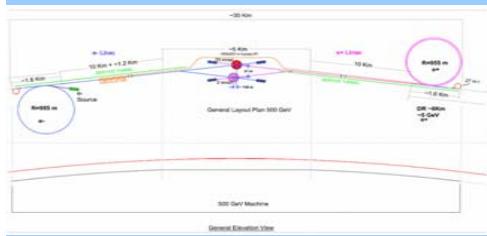
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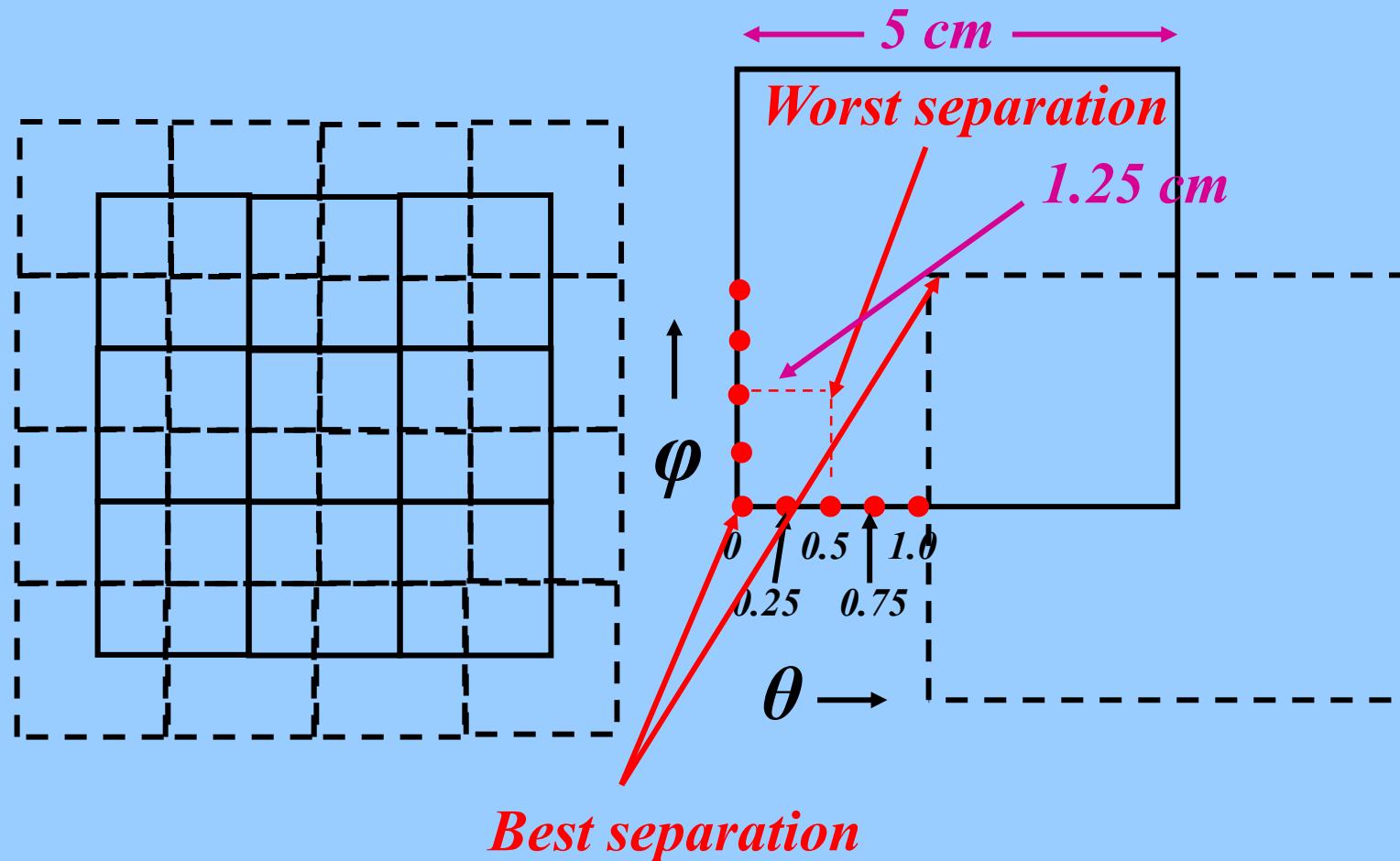
Results from Electromagnetic Shower Simulations

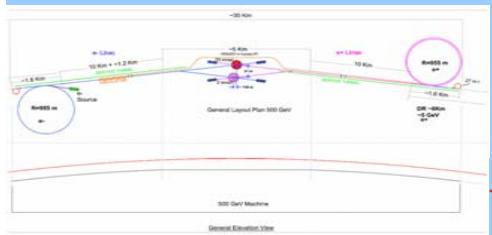




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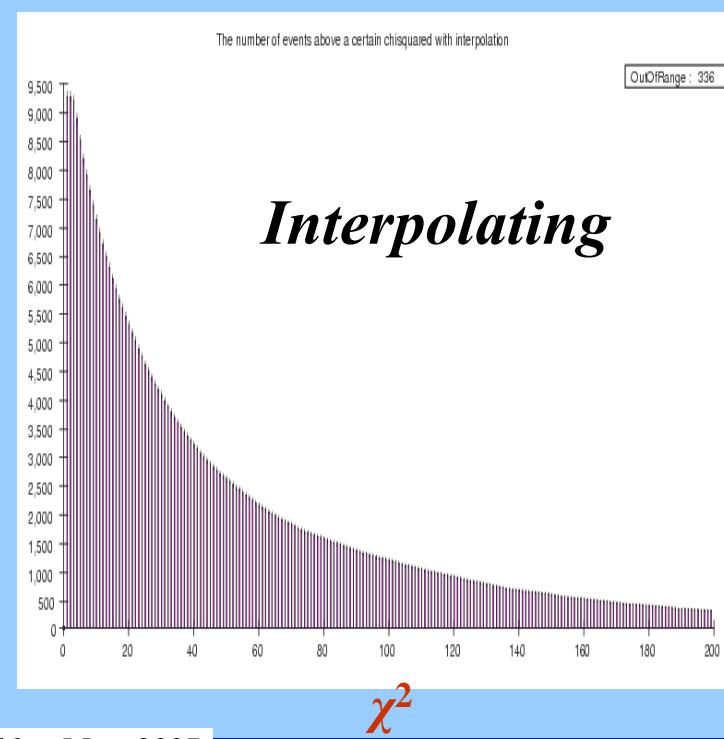
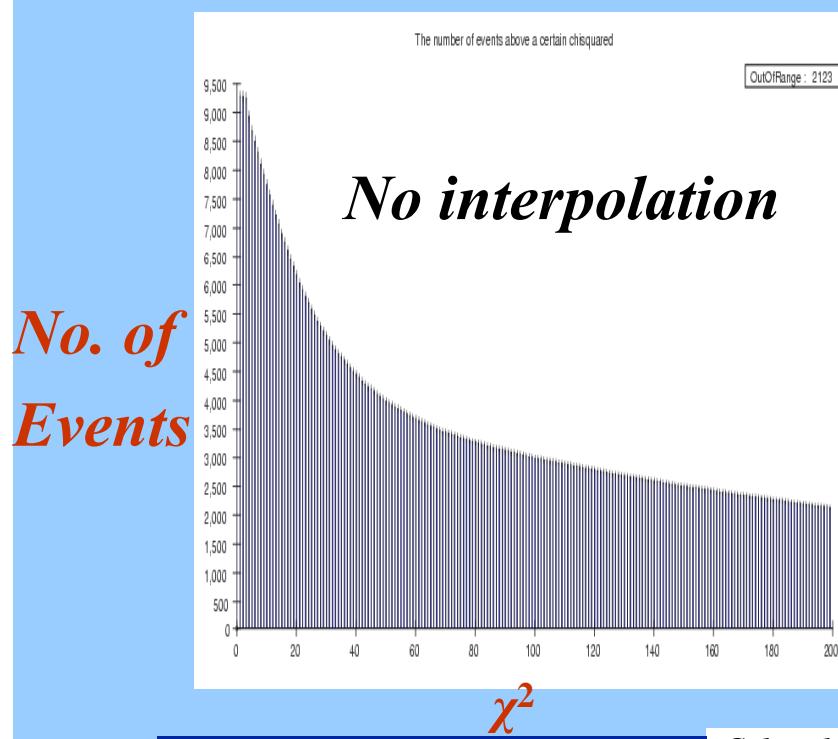
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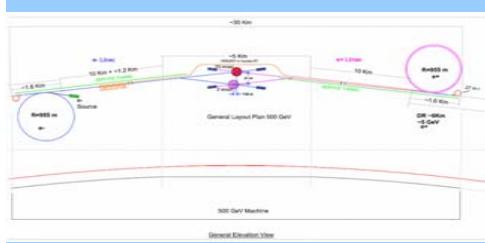
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Result from Electromagnetic Shower Simulation (3 layers 6,8,10)

Number of events with Chi-Square greater than





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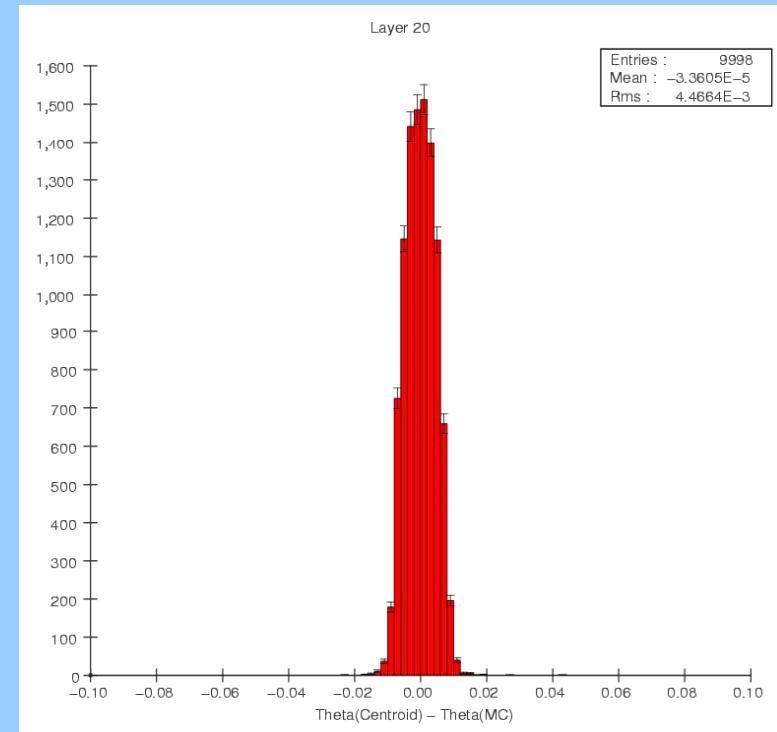
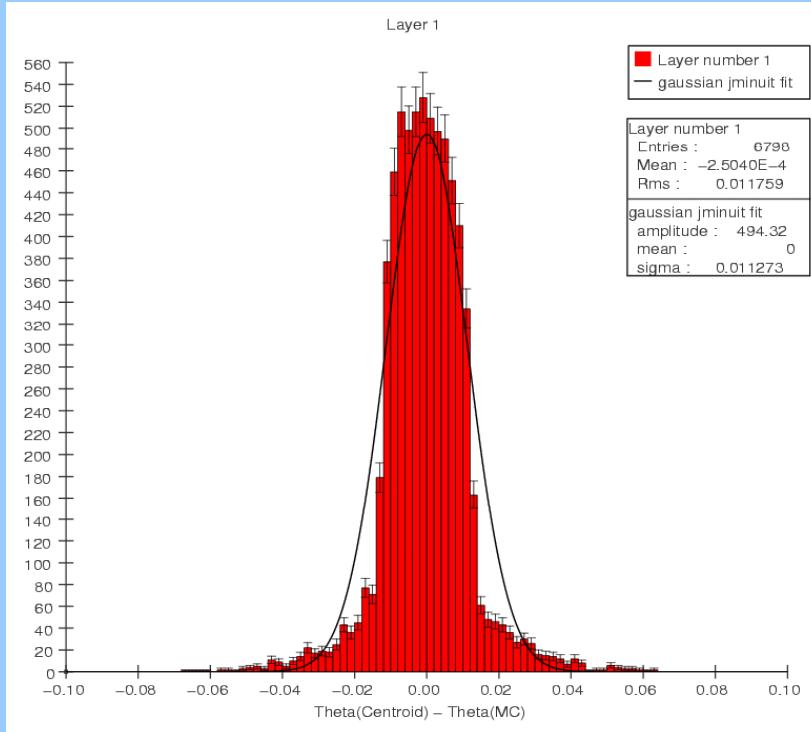


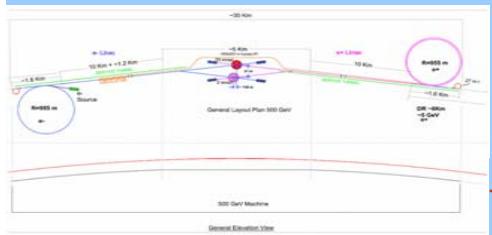
Results from Electromagnetic Shower

1st layer

Simulation

20th layer

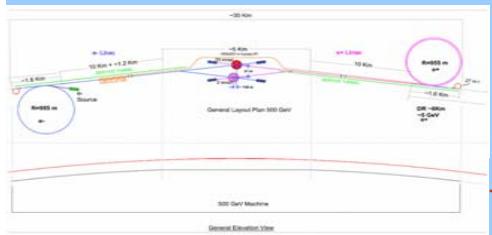




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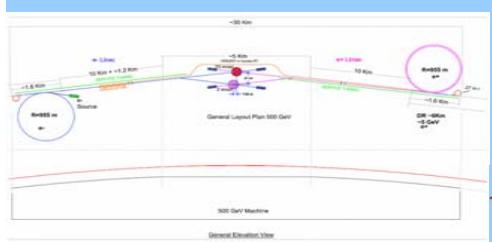




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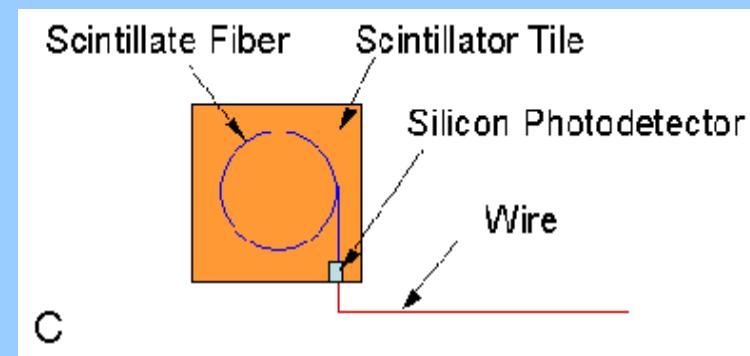
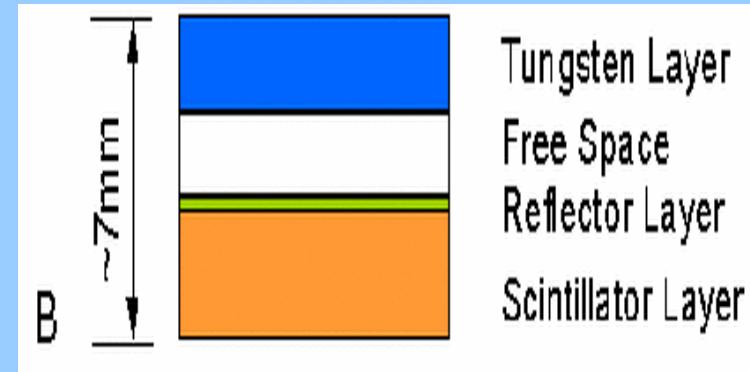
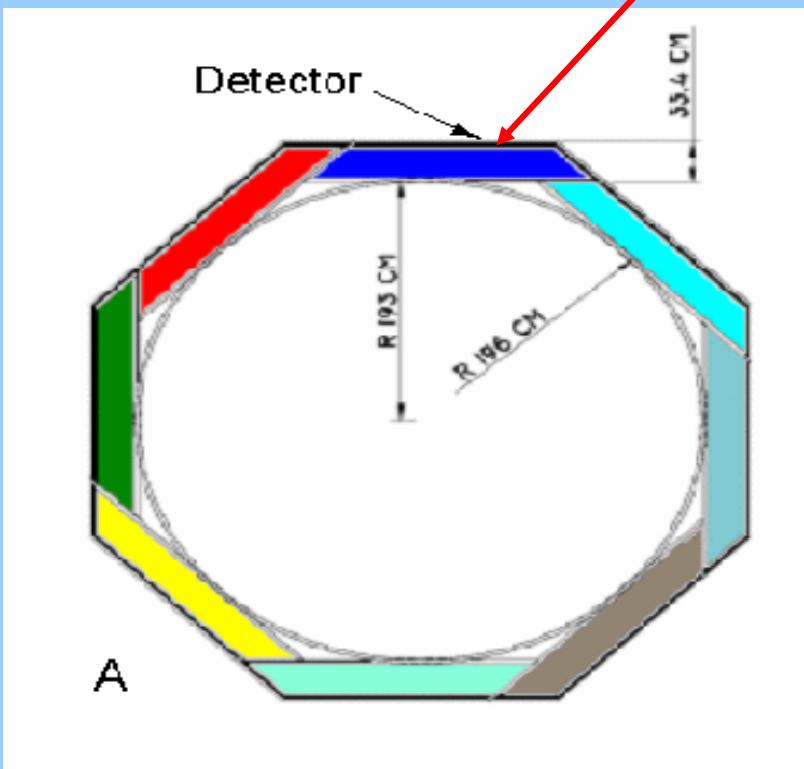
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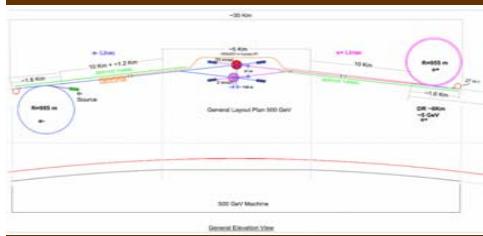
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Modules

Each module = ~12 tons





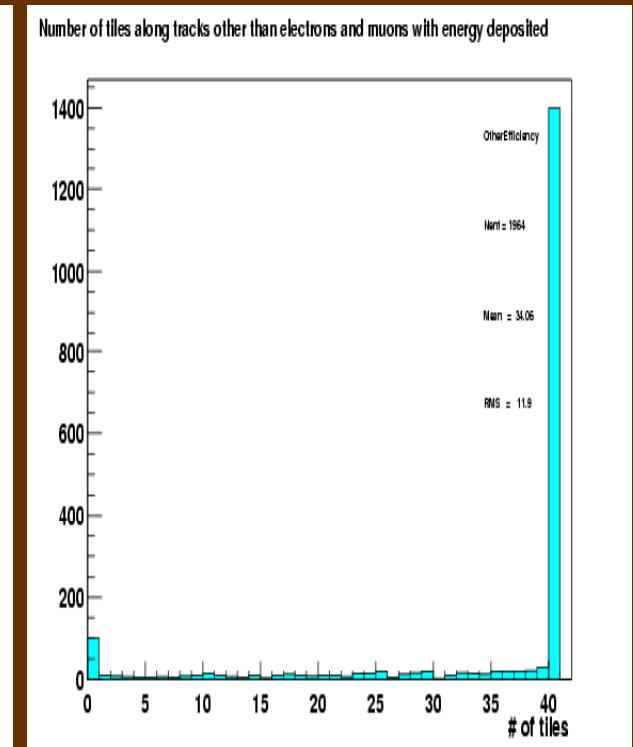
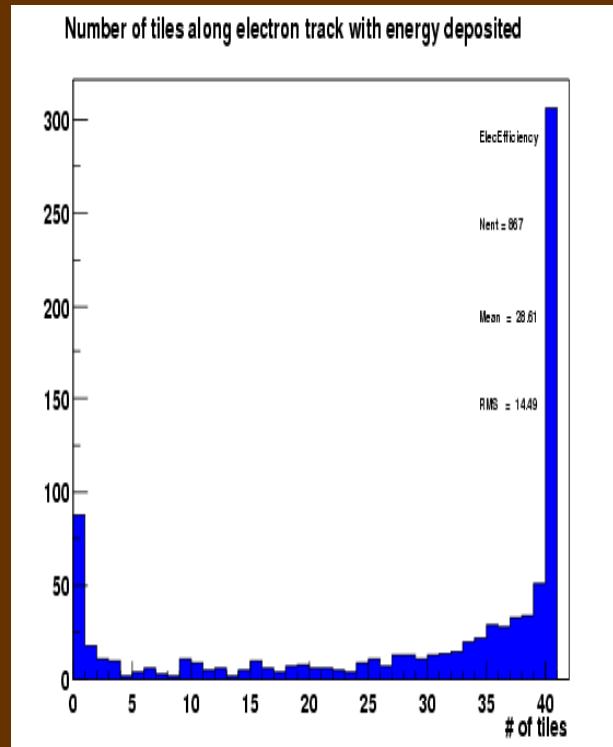
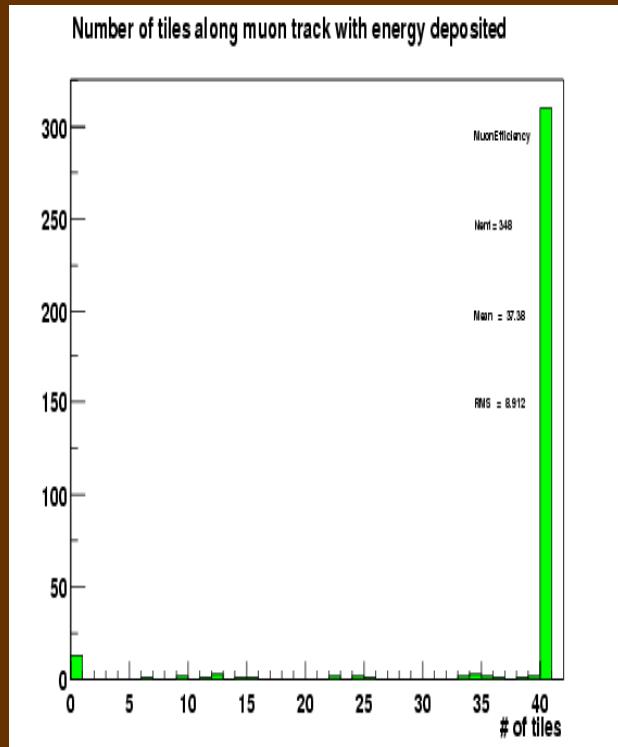
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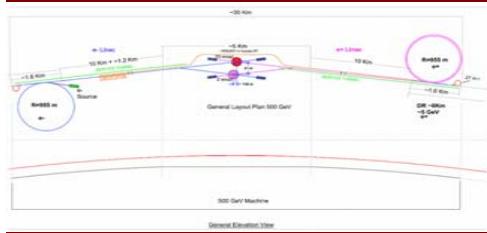
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Computer Simulation

Propagation of charged tracks from the tracker into the calorimeter





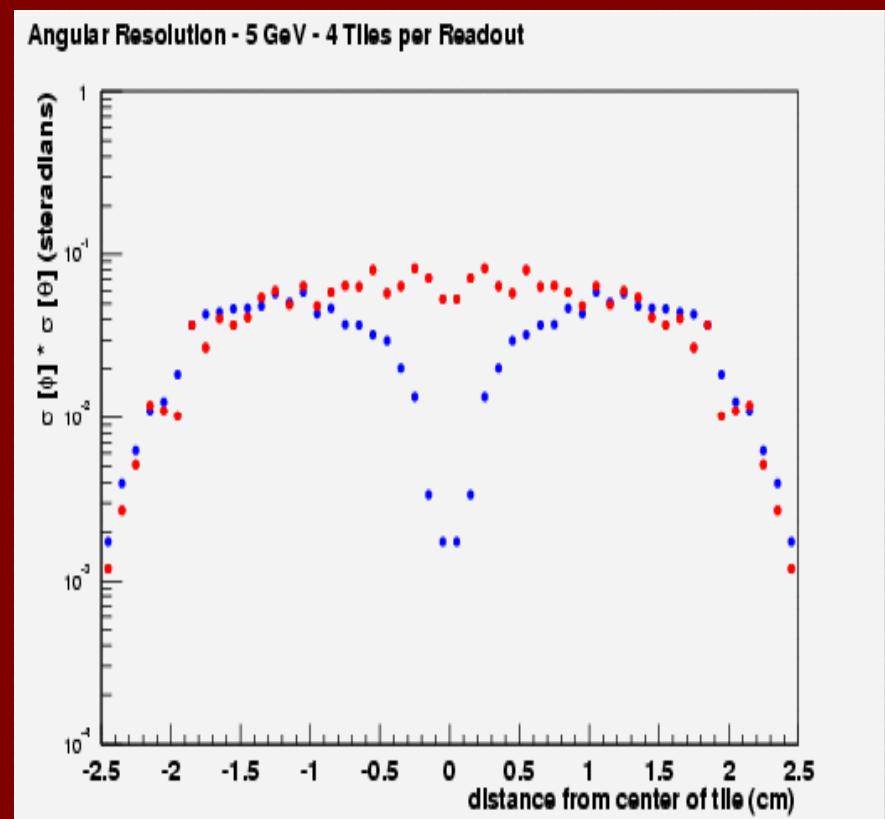
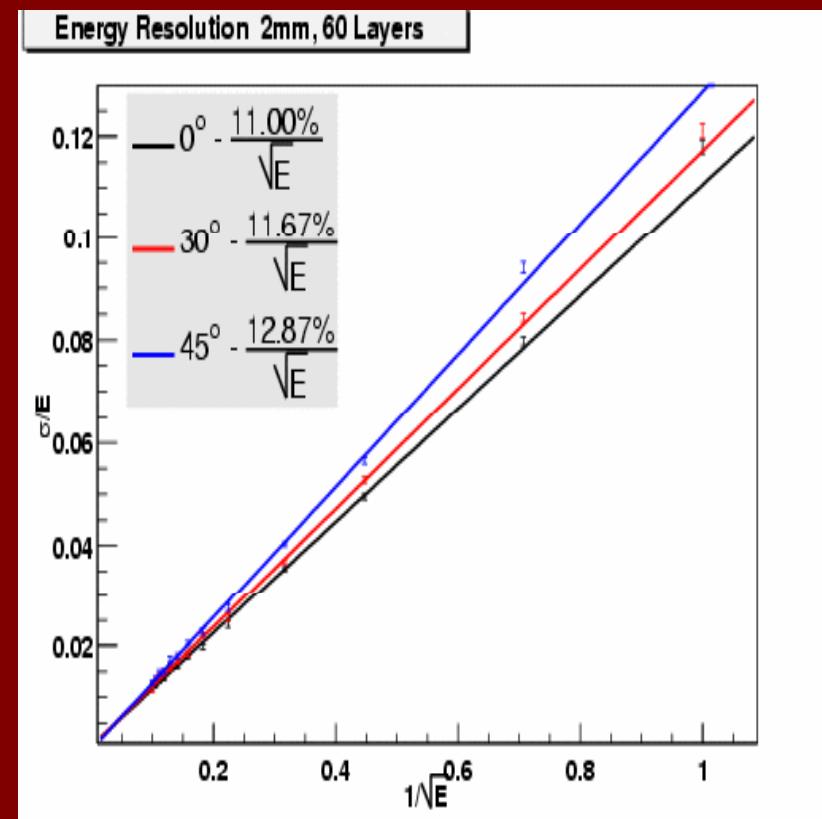
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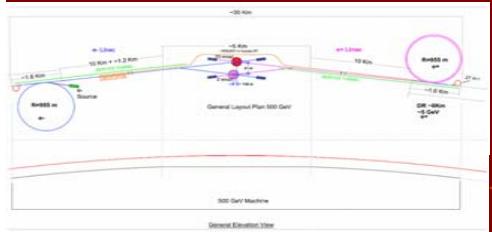
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Simulation

1/2 Xo





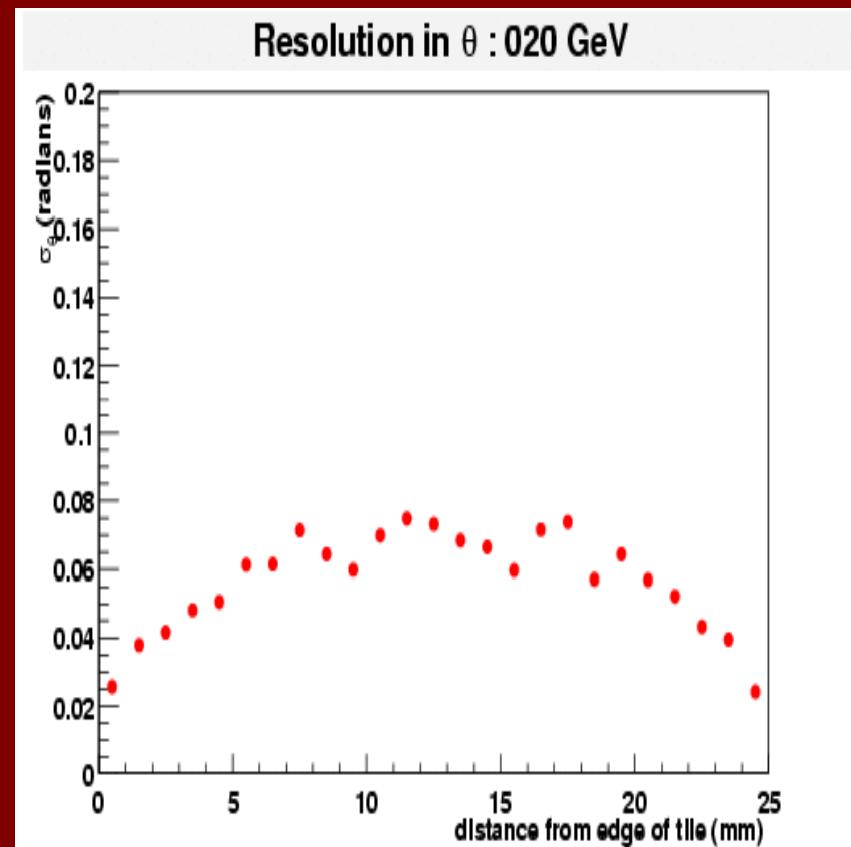
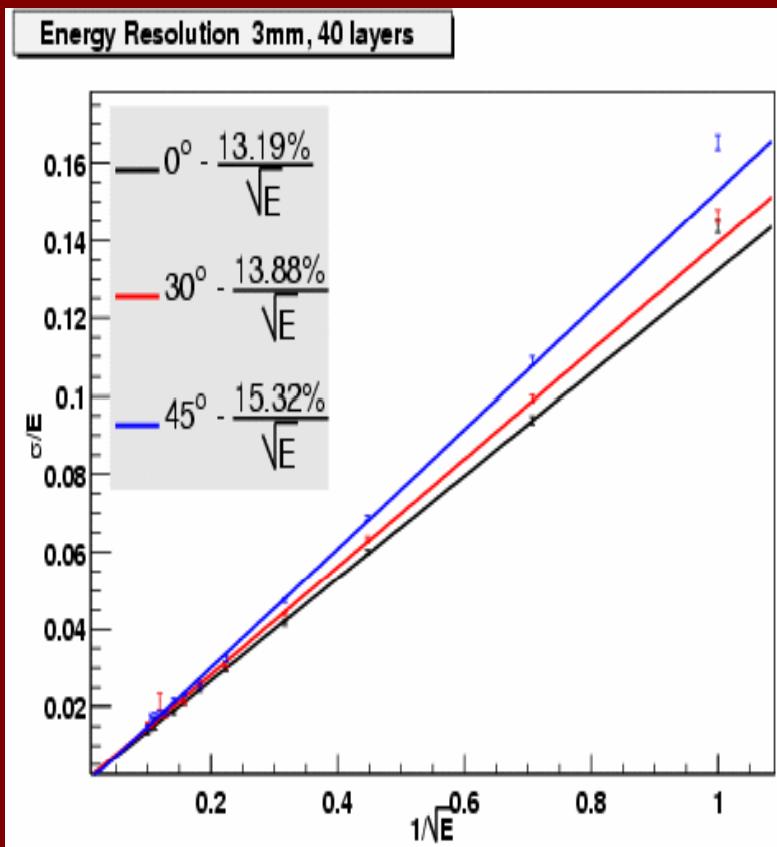
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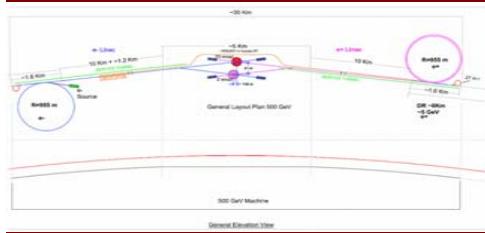
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Simulation

3/4 Xo





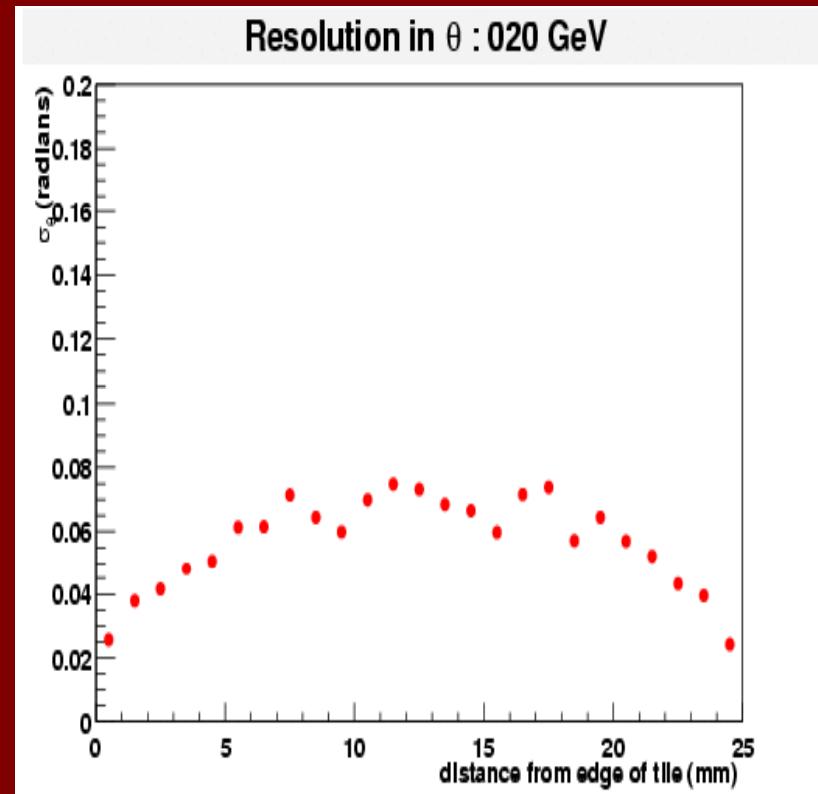
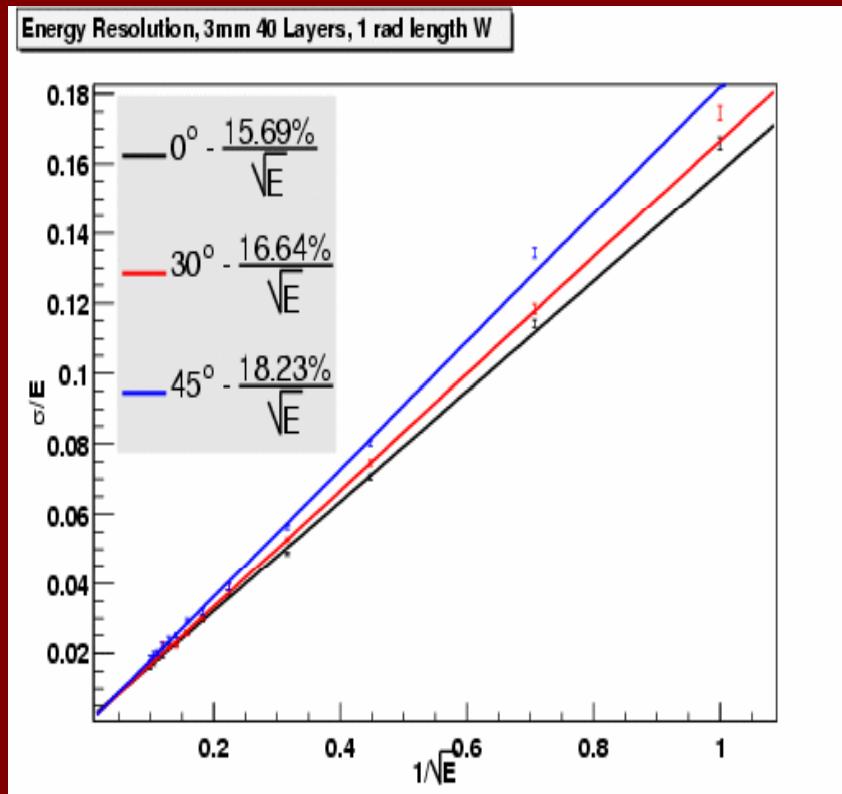
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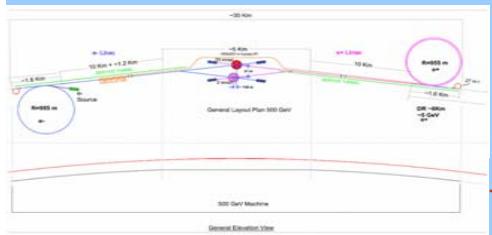
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Simulation

1 Xo





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