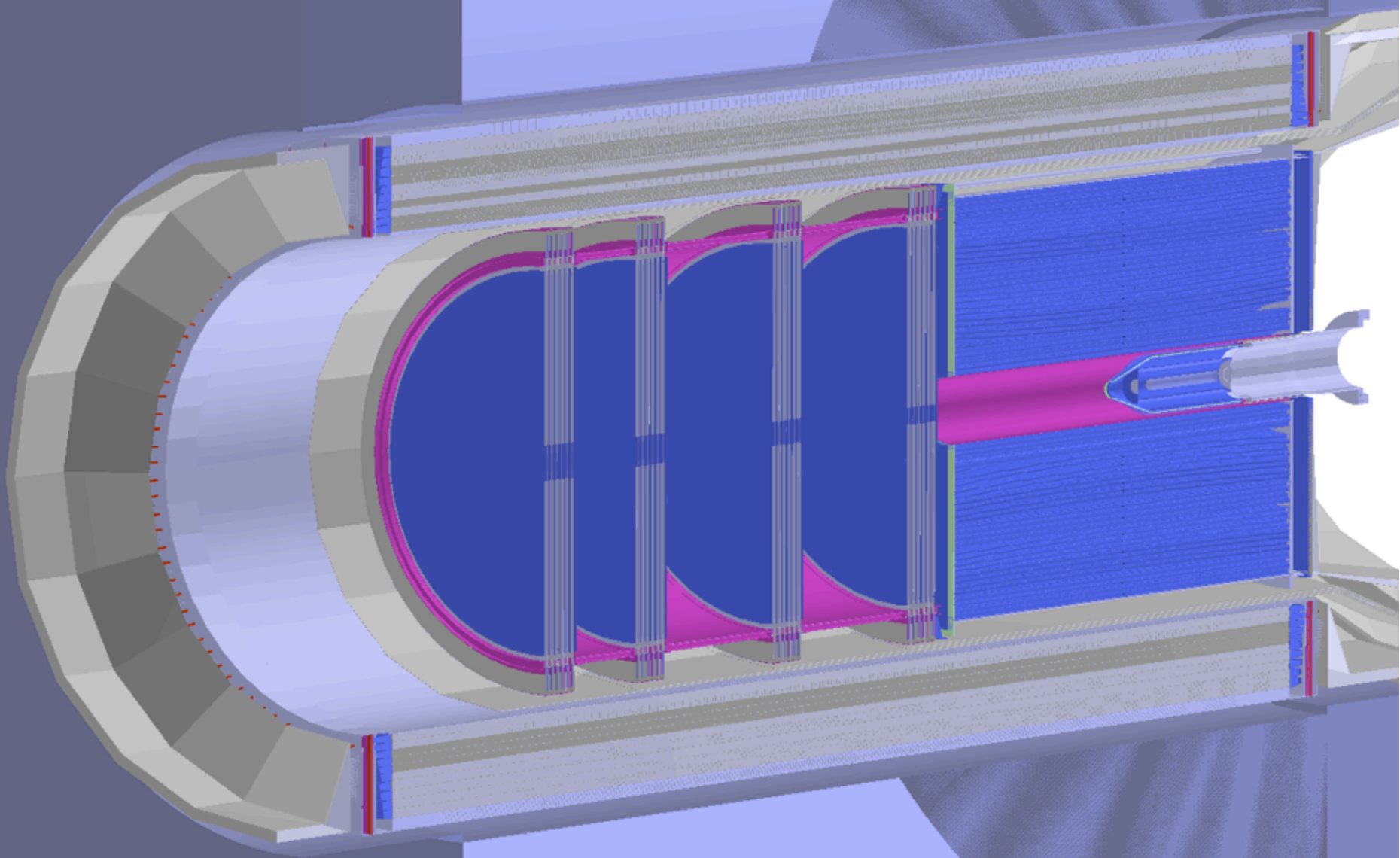


Photon Detection Efficiency

- Study photon efficiency for various PID options
 - Default: Baseline Gluex
 - Gas Cherenkov
 - Helium FDC
 - HBRICH
- Single Photon Gun
 - Uniform in polar angle from 0 to 30 degrees
 - Uniform in energy from 0 to 2 GeV

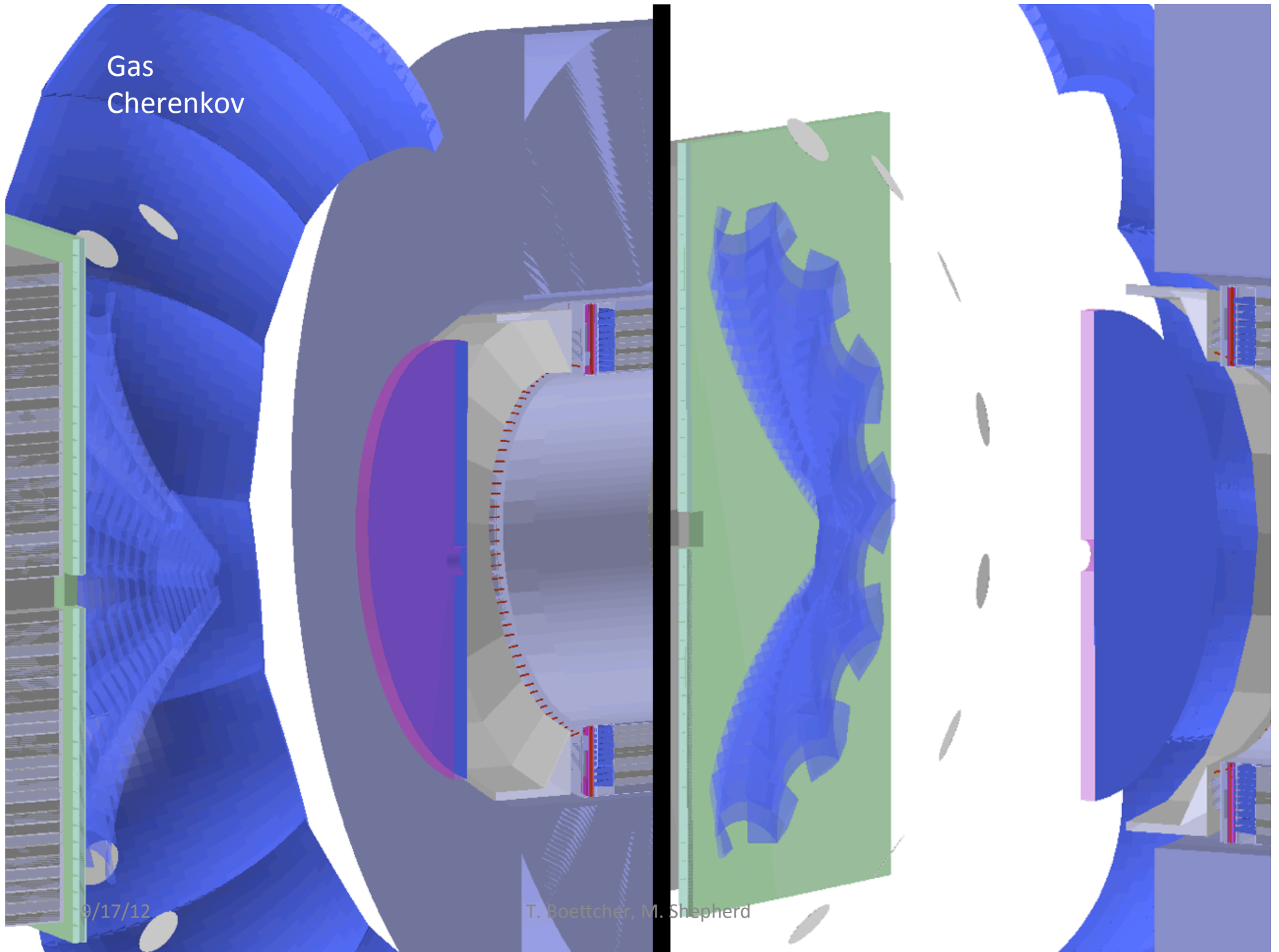
Baseline GlueX



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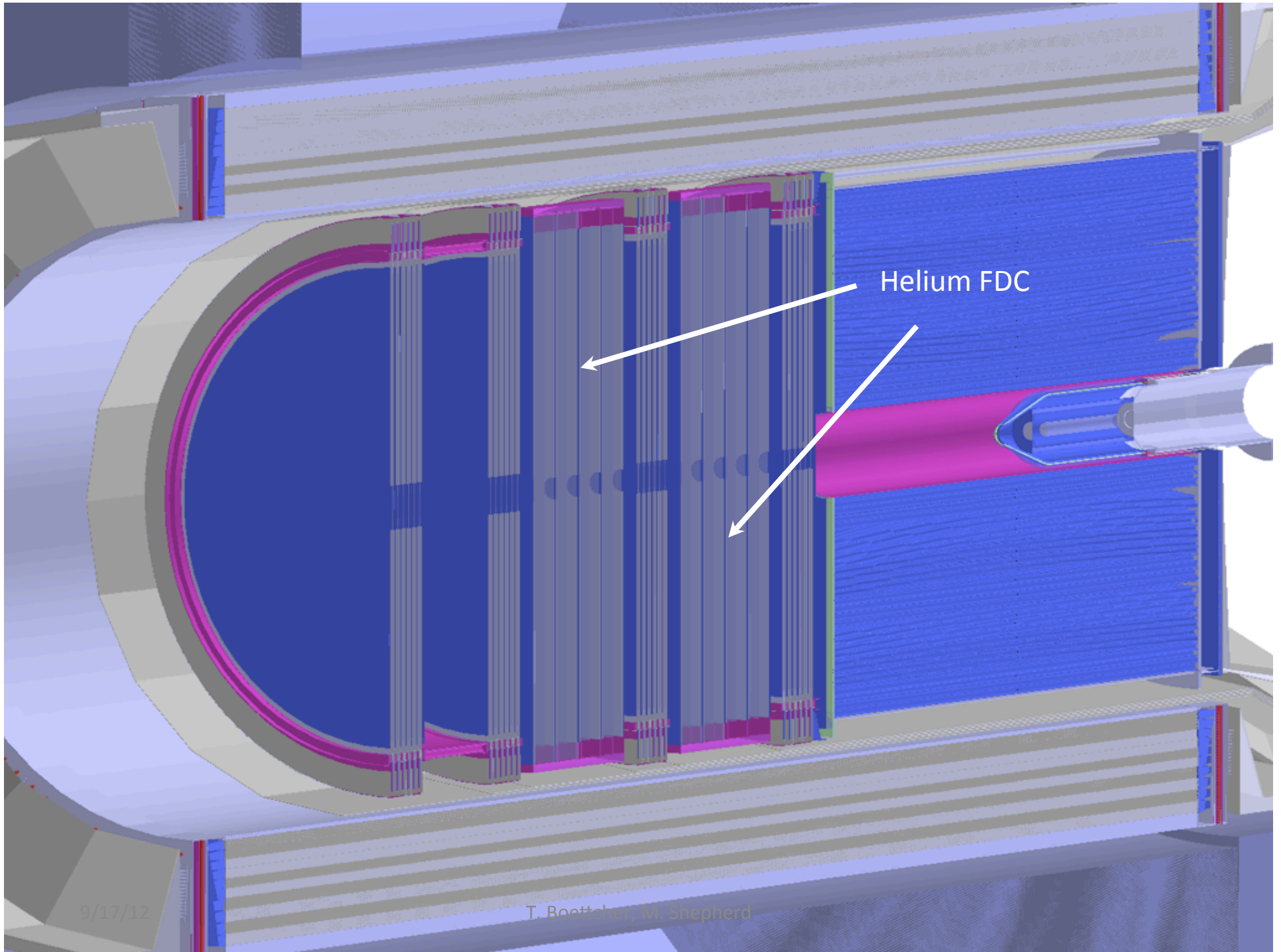
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Gas
Cherenkov



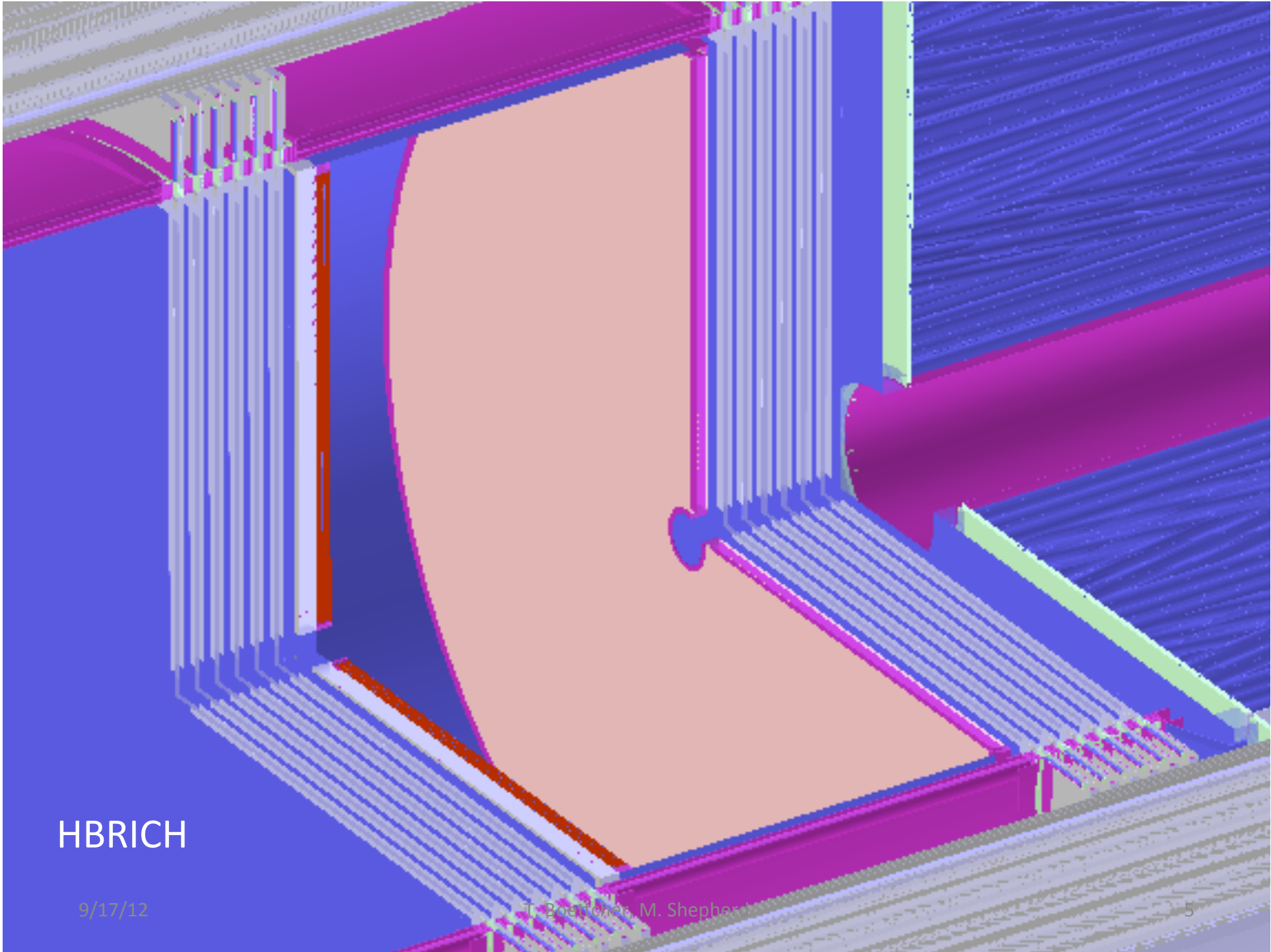
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HBRICH

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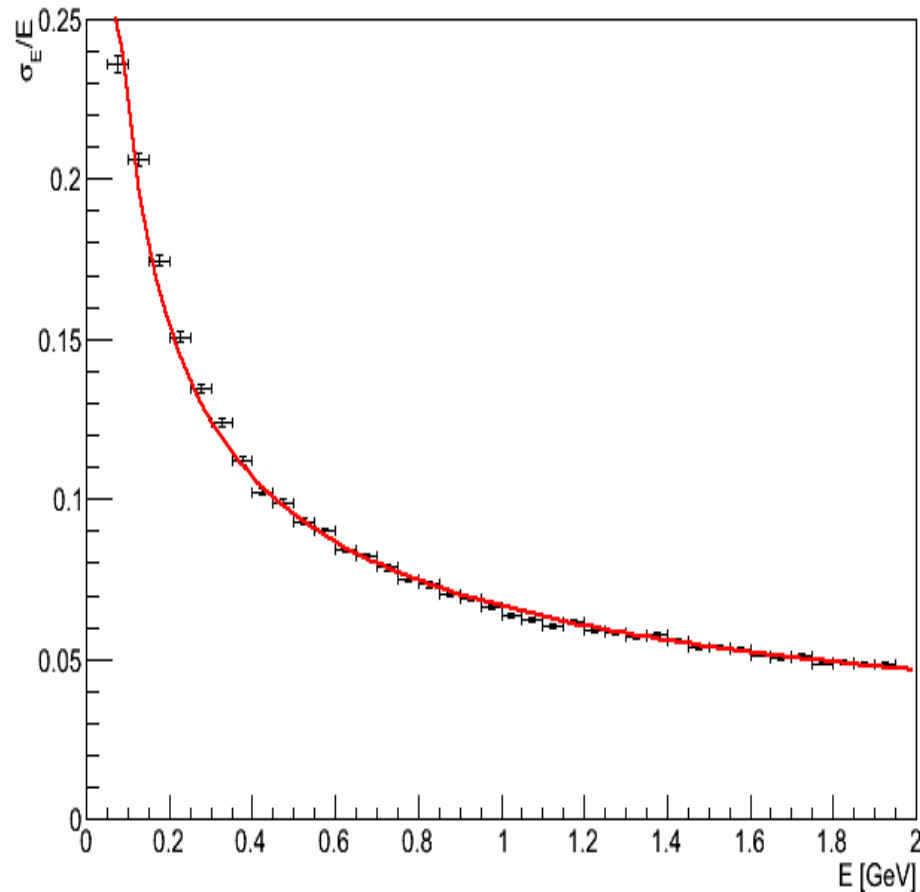
Energy Dependent Cut

$$\frac{\sigma_{E_{gen}}}{E_{gen}} = \frac{.00299}{E_{gen}} + \frac{.06357}{\sqrt{E_{gen}}}$$

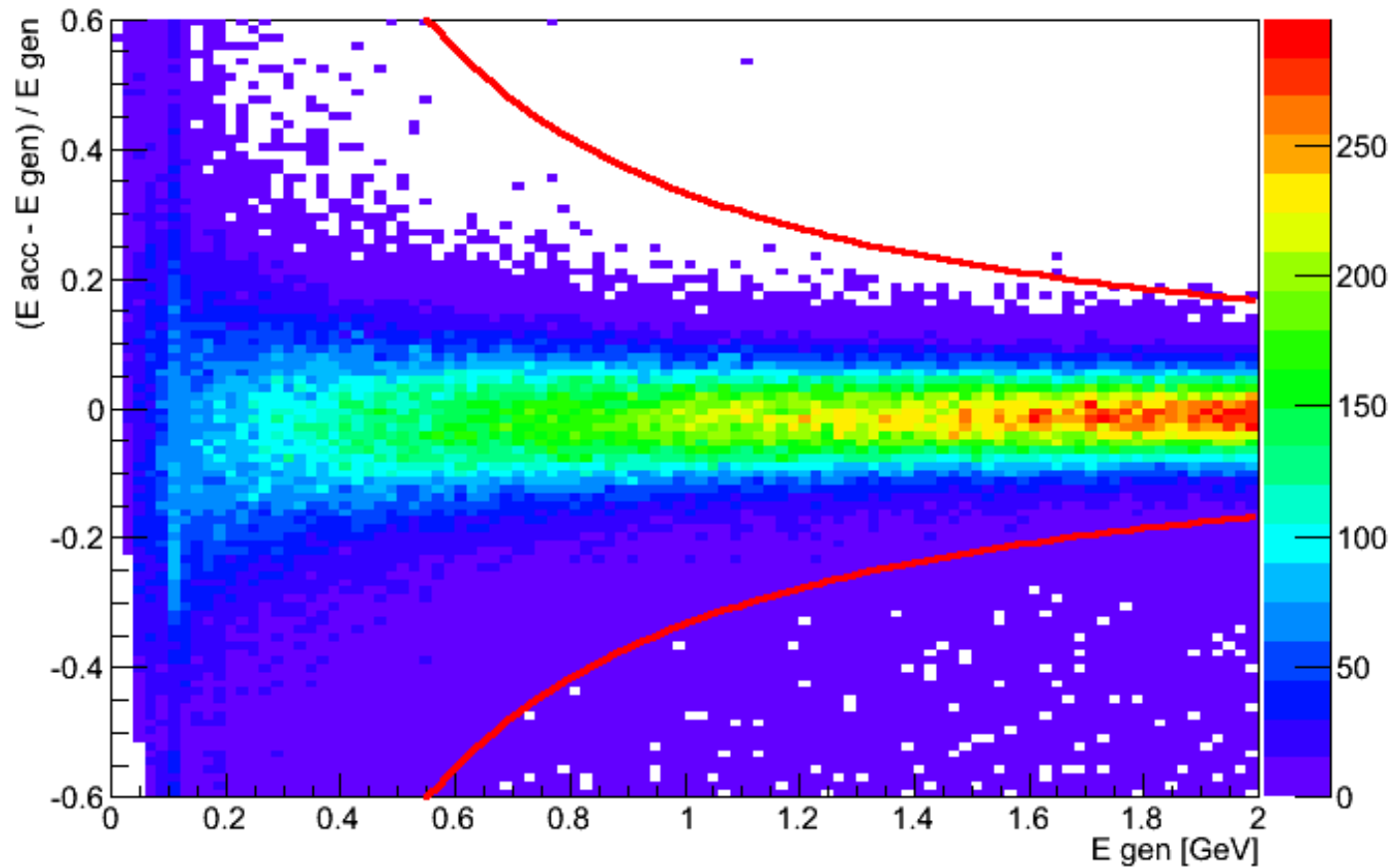
Determine resolution using
the default geometry

Require reconstructed energy
of “found” photons to be within
 $n\sigma$ of generated energy

try both $n = 2$ and 5

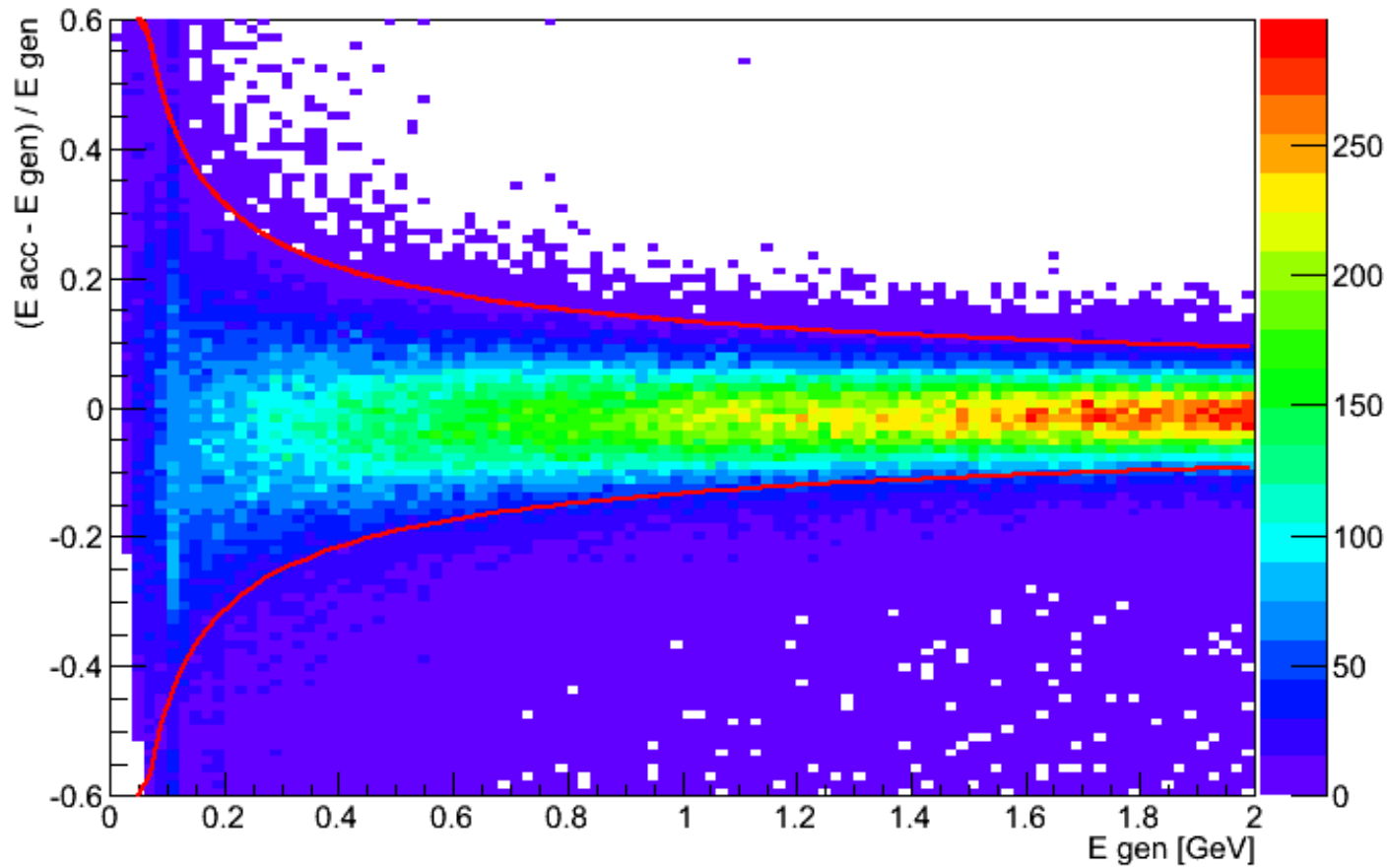


Finding Photons, 5σ Cut



Default Geometry

Finding Photons, 2σ Cut

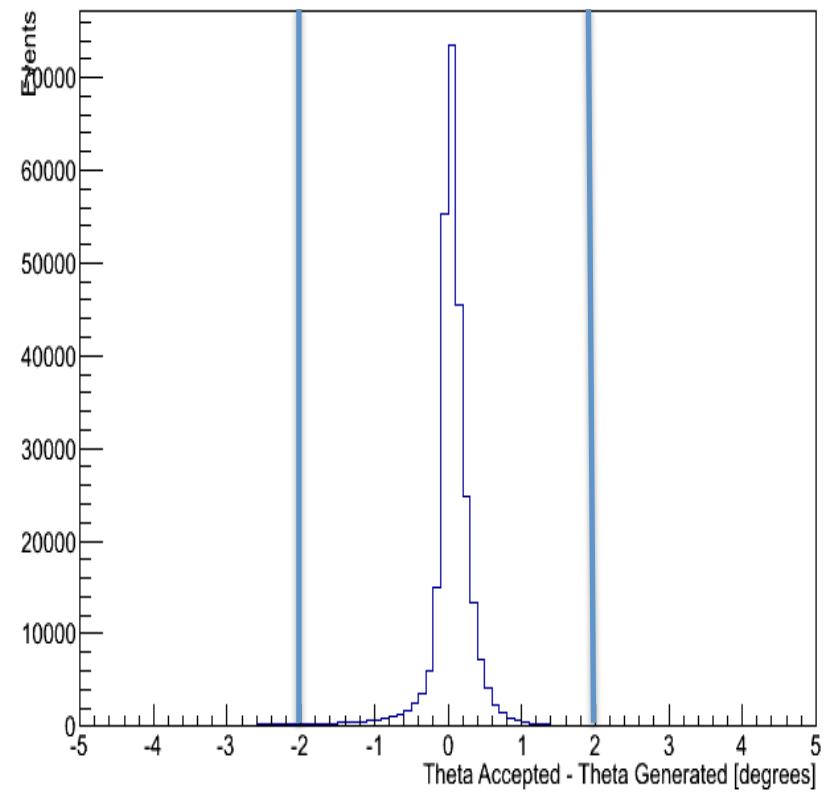
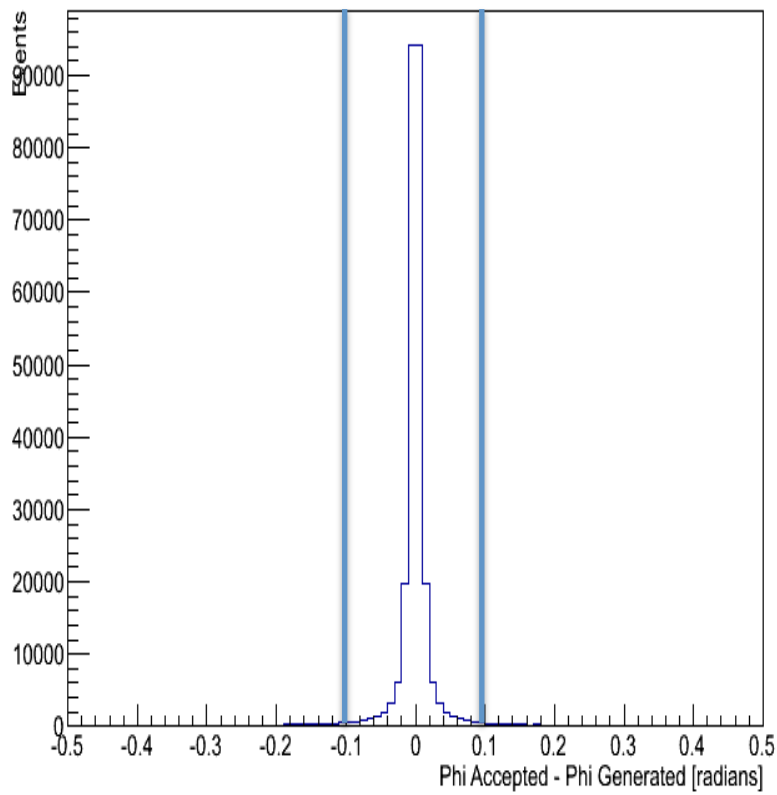


Default Geometry

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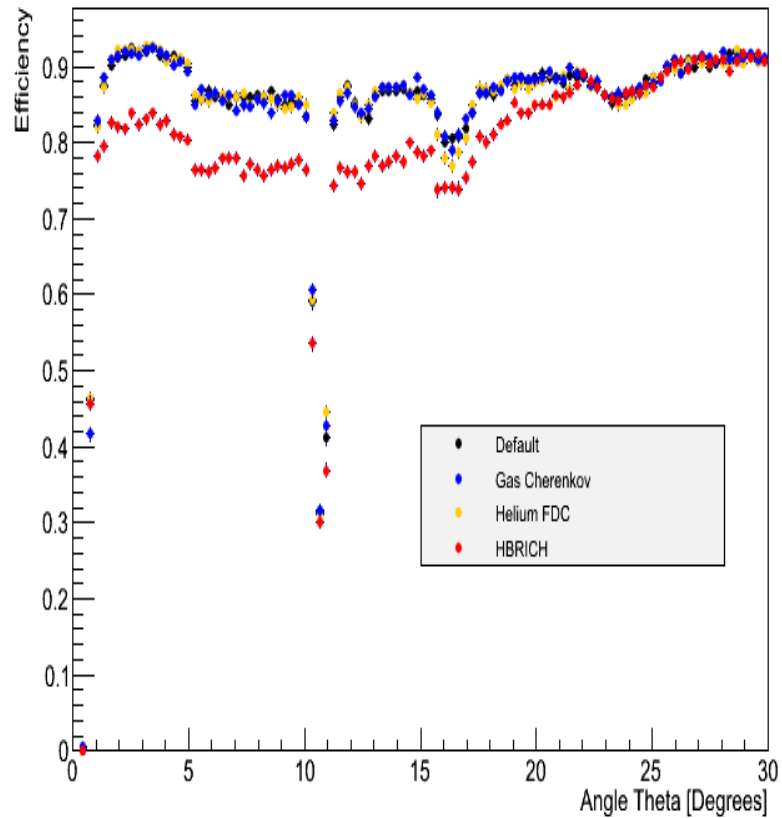
Finding Photons

(Angular Requirements)

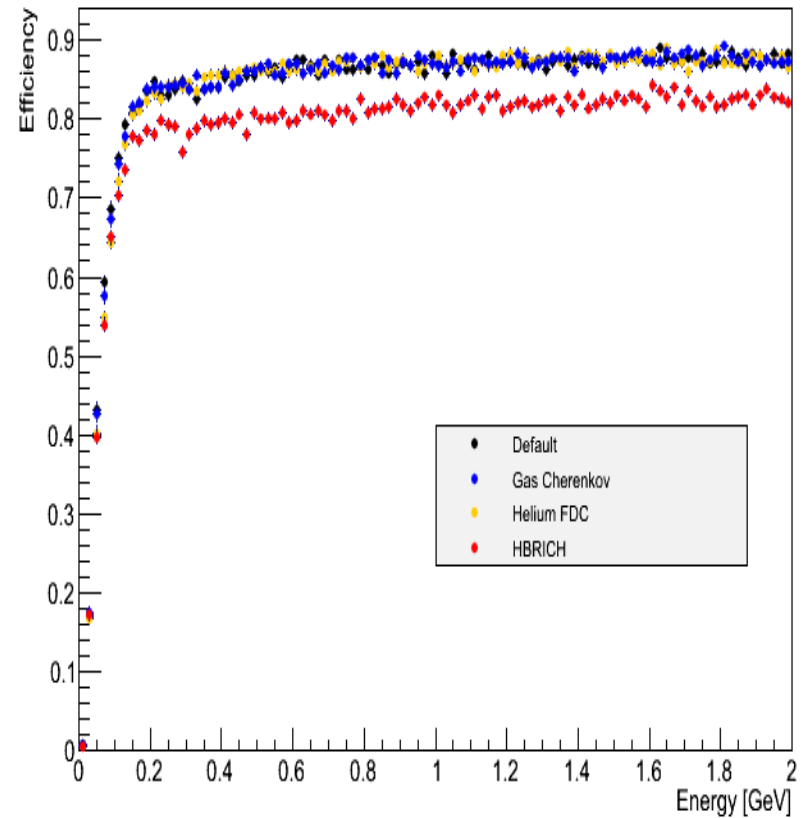


Efficiencies, 5σ

Efficiency vs. Theta

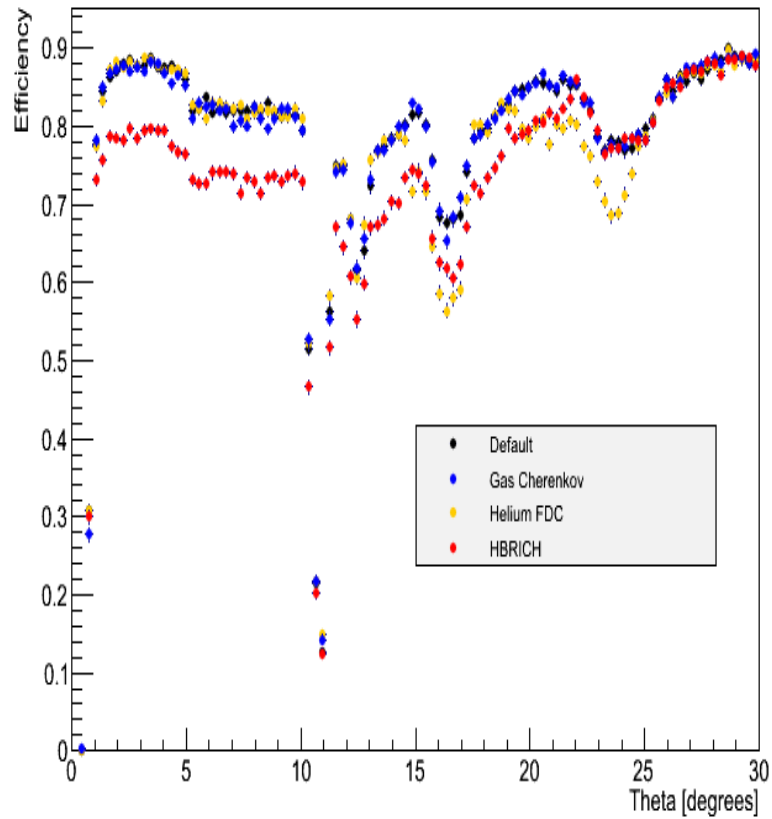


Efficiency vs. Energy

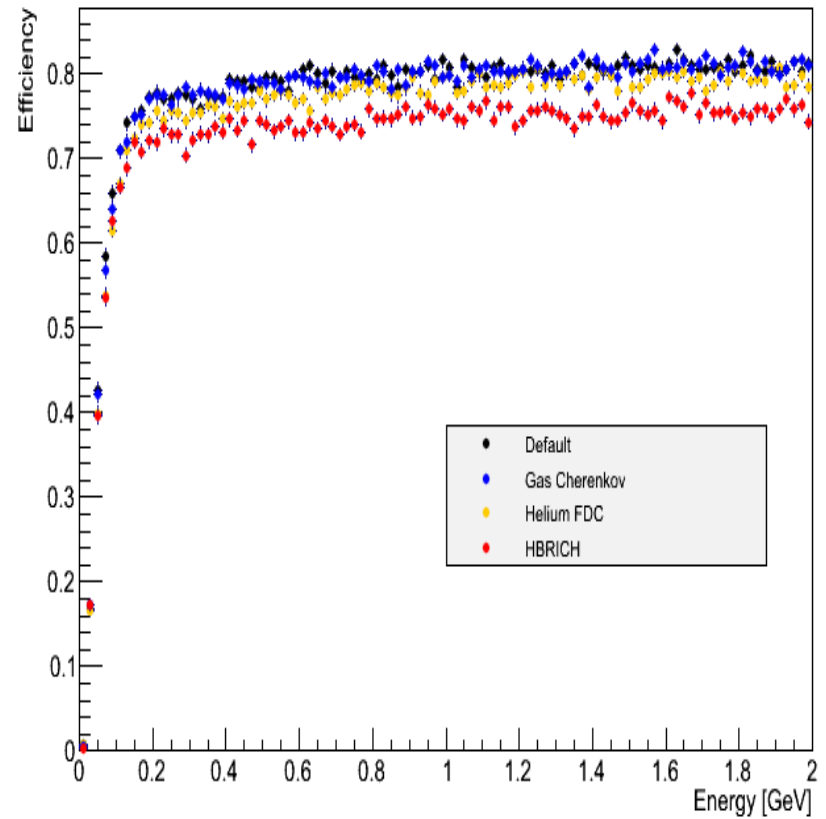


Efficiencies, 2σ

Efficiency vs. Theta



Efficiency vs. Energy



Conclusions

- HBRICH
 - About 10% less efficient than default at angles less than 15 degrees
 - Photons are lost because conversion is far from calorimeter
- Helium FDC
 - Little to no effect with a 5σ dependent cut
 - About 10% less efficient less than default at angles between 15 and 25 degrees using 2σ cut
 - Photons are reconstructable but resolution is degraded
- Gas Cherenkov
 - Best photon reconstruction efficiency for all three options