



SciGlass update

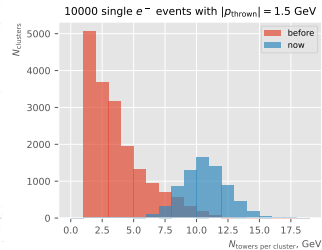
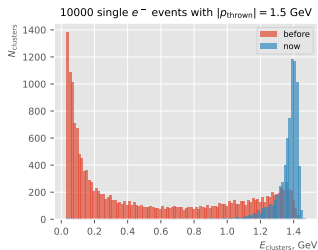
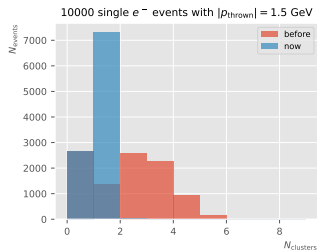
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University of Kentucky

Clustering

Island Clustering for SciGlass

With new adjacencyMatrix definition based on cellID the SciGlass clustering working in EICrecon and Juggler.

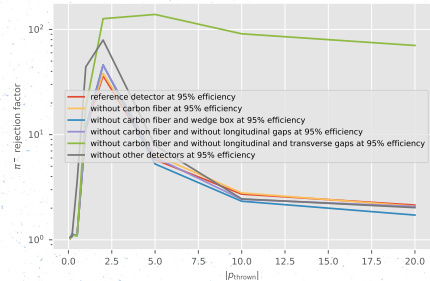
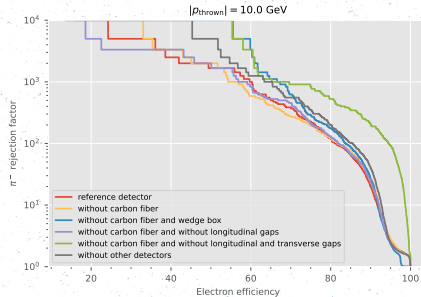


Single pion production using geometry description 23.01.0 has this fix.

π^-/e^- separation

Pion rejection

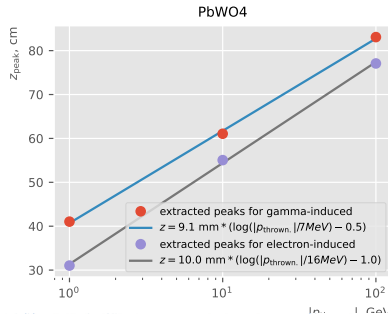
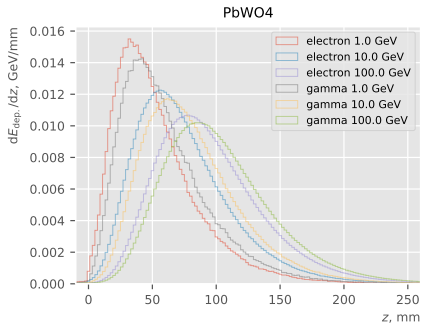
Looking at detector variations in more detail



Removing the transverse gaps (φ acceptance) have large effect, other changes do not.

Radiation length (PbWO₄)

Single particle simulation against a simple cube geometry (Birk's law correction disabled). Rossi approximation used to extract X_0 and E_c from longitudinal shower profiles.

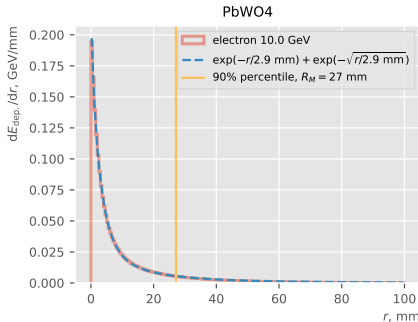


PbWO₄ properties table:

https://pdg.lbl.gov/2009/AtomicNuclearProperties/HTML_PAGES/301.html

Molière radius (PbWO₄)

Single particle simulation against a simple cube geometry (Birk's law correction disabled).

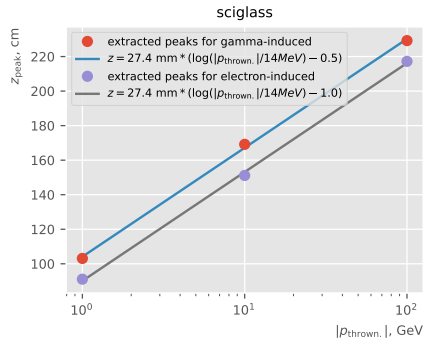
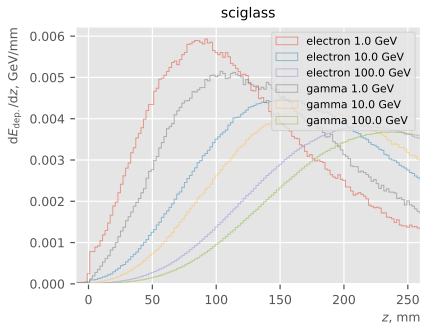


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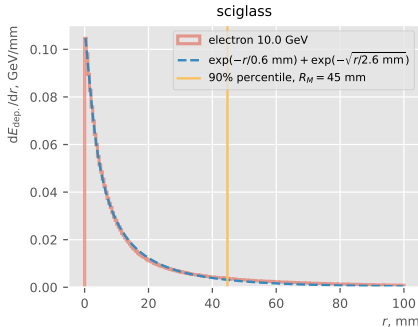
SciGlass properties:

https://wiki.bnl.gov/conferences/images/9/98/ERD105_SciGlass_FY22.pdf

Note we define 4.22 g/cm^3 density in our simulations

Molière radius (SciGlass)

Single particle simulation against a simple cube geometry (Birk's law correction disabled).



SciGlass properties:

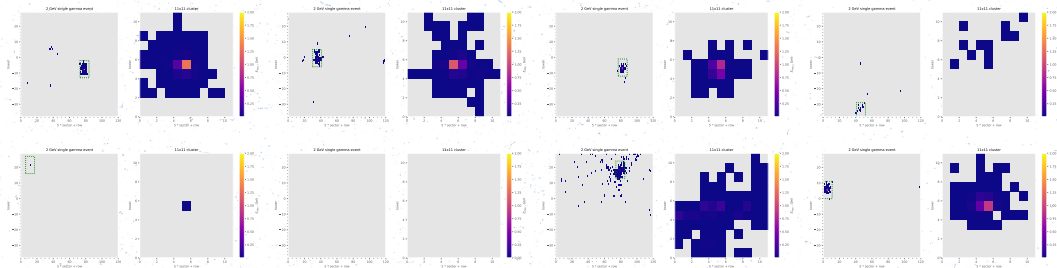
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π^0/γ separation

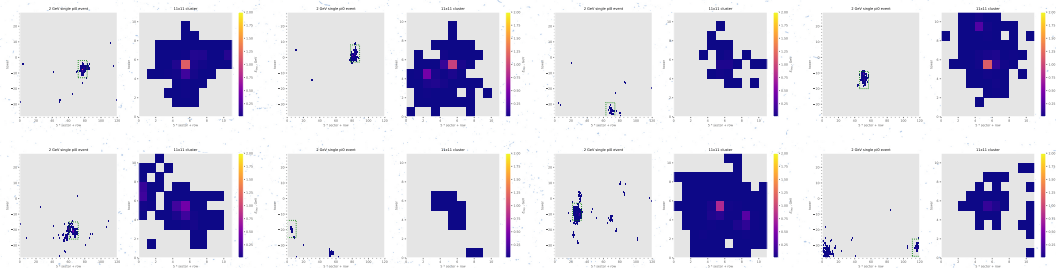
Example γ events

Left: 2 GeV single particle events, Right: corresponding zoomed 5×5 leading clusters



Example π_0 events

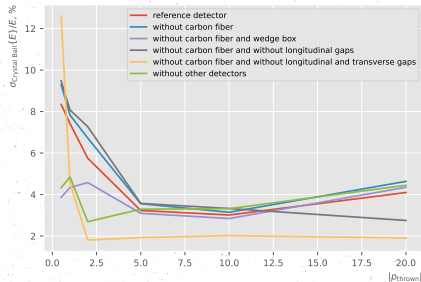
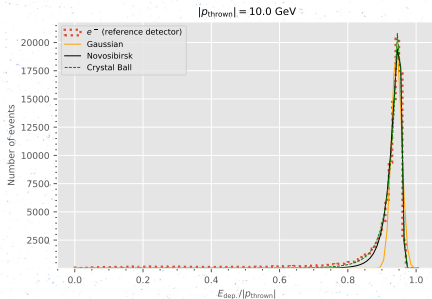
Left: 2 GeV single particle events, Right: corresponding zoomed 5×5 leading clusters





Energy resolution

Energy resolution (WIP)



Agreed with Maria on using Crystal Ball. Not clear if should use the scale fit parameter $\sim$ FWHM or $\sqrt{\text{variance}}$ of the distribution. Latter is presented on this slide.

Digitization in reconstruction

Help wanted

Looking for a student familiar with C++/ROOT (supervision not provided), final result in 4 weeks

Task

- 1 Use Petr's code from <https://github.com/JeffersonLab/glass-prototype>
- 2 Modify steering to reproduce tower geometry (45 cm length)
- 3 Use dimensions of Hamamatsu S14161-6050HS-04, 16 per tower
- 4 Enable optical photon simulation
- 5 Run simulation and estimate average number of photons that reach the MPPCs per GeV of incident energy