

Updated sampling fraction

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THE OHIO STATE UNIVERSITY

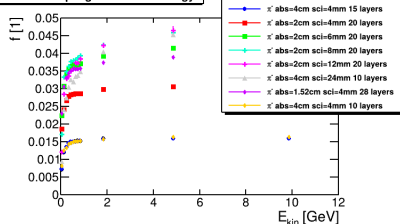
1 Updates

$$f_s = \frac{\sum E_{scint}}{E_k}$$

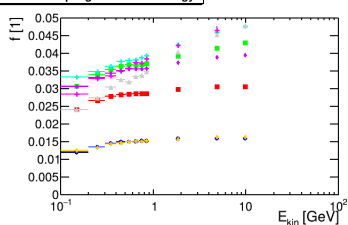
- Sampling fraction calculated by filling a TProfile with a ratio of sum of energy deposits in scintillator tiles E_{scint} over kinetic energy of incoming particle
- calculates correct e/h response ratios
 - same method as used in beam tests (kinetic energy as a reference)
 - this is not the case when using sum of energy deposits in steel and plastic in the denominator (LFHCAL method)
 - missing energy for pions
- Previously made all geometry versions $5\times$ thicker ($\lambda/\lambda_0 > 10$)
 - Now switched to real thickness to better relate sampling fraction to the kinetic energy
- Turned out that previous simulations were performed with $180^{\text{deg}} < \theta < 175^{\text{deg}}$
 - Done in order to have perpendicular showers
 - Particles selected in nHCal acceptance $-4 < \eta < -1$
- Now, extended to (almost) full acceptance $175^{\text{deg}} < \theta < 135^{\text{deg}}$
 - Particles selected in narrower nHCal acceptance $-3.8 < \eta < -1.5$ to avoid leaking showers through the edges
 - NEW! Fixed the geometry path used to select sensitive layers

Deep version

nHCal sampling fraction vs. energy

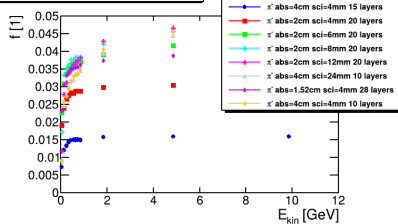


nHCal sampling fraction vs. energy

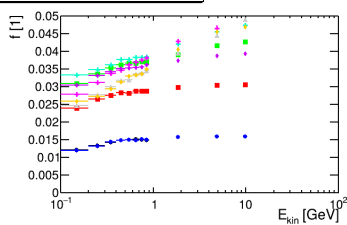


Real

nHCal sampling fraction vs. energy

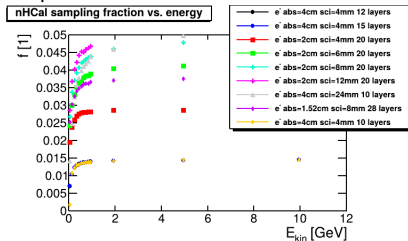


nHCal sampling fraction vs. energy

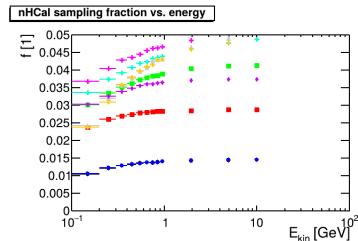
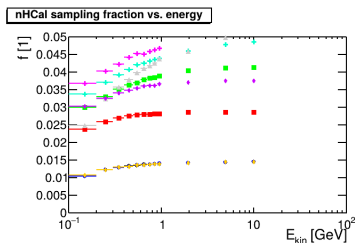
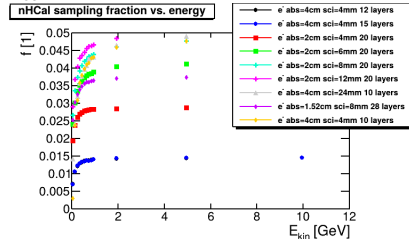


- NEW! Fixed the geometry path used to select sensitive layers
- Sampling fraction increases vs. energy for geometries with thicker scintillator tiles
 - Expected non-linearity for thicker tiles
- Default geometry changed from 4 mm to 24 mm tiles

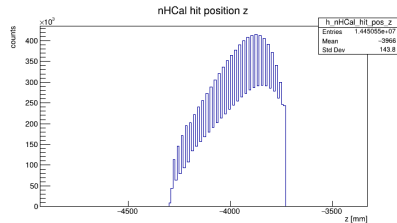
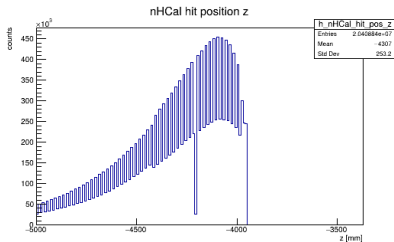
Deep version



Real



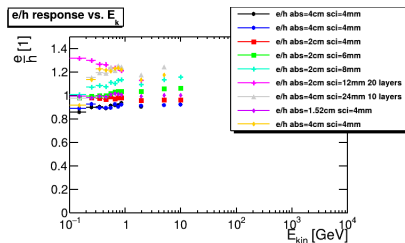
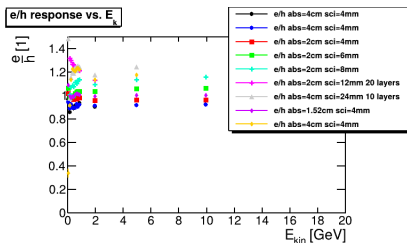
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- Geometries with thicker tiles show greater e/h response

- Fixed the geometry path used to select sensitive layers
- Sampling fraction increases vs. energy for geometries with thicker scintillator tiles
 - Expected non-linearity for thicker tiles

BACKUP



- Geometries created correctly