

# Updated sampling fraction

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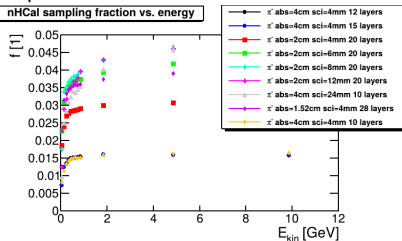
THE OHIO STATE UNIVERSITY

## 1 Updates

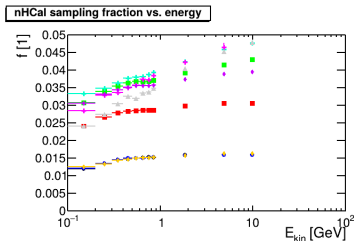
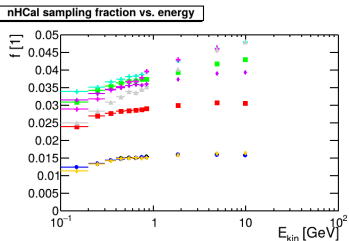
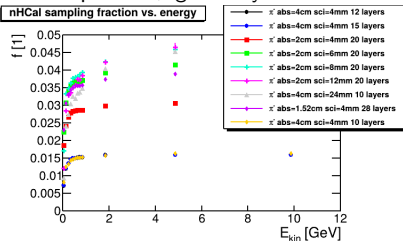
$$f_s = \frac{\sum E_{scint}}{E_k}$$

- 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
- made all geometry versions  $5\times$  thicker ( $\lambda/\lambda_0 > 10$ )
  - This minimizes leakage and relates better to the real energy deposits
- 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

## Perpendicular

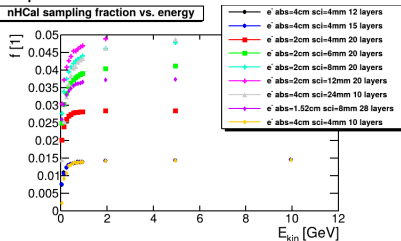


## Full acceptance + geometry fix

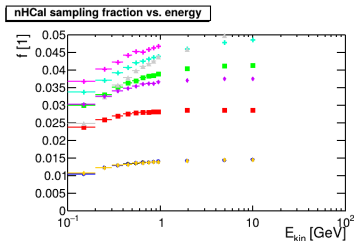
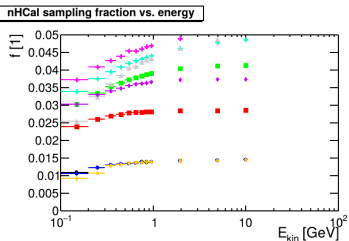
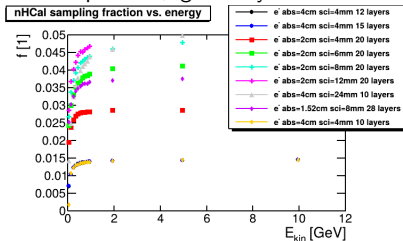


- NEW! Fixed the geometry path used to select sensitive layers
- Sampling fraction increases vs. energy for geometries with thicker scintillator tiles
  - Expected non-linearity for thicker tiles

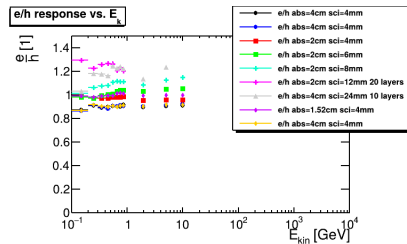
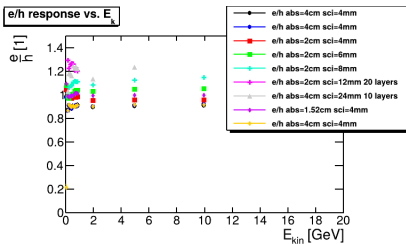
## Perpendicular



## Full acceptance + geometry fix



- 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



- 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**