Updated sampling fraction

Leszek Kosarzewski

The Ohio State University/Warsaw University of Technology

nHCal DSC meeting 21.4.2026

THE OHIO STATE UNIVERSITY

Outline

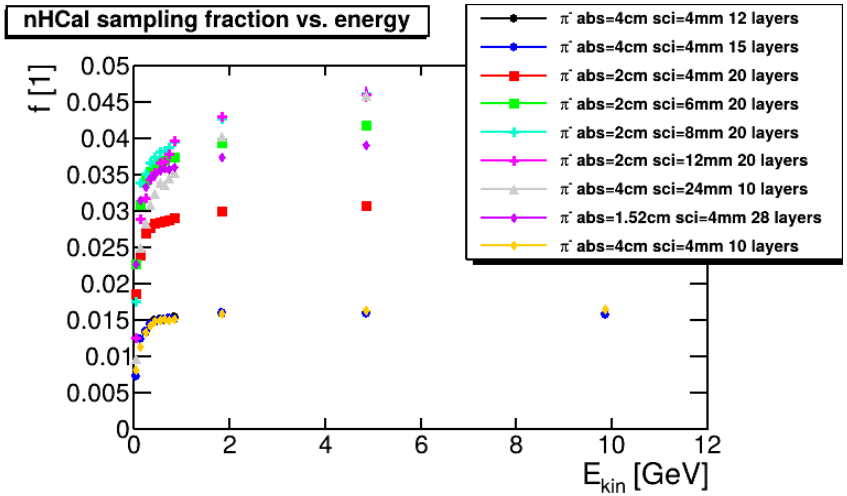
Updates - sampling fraction

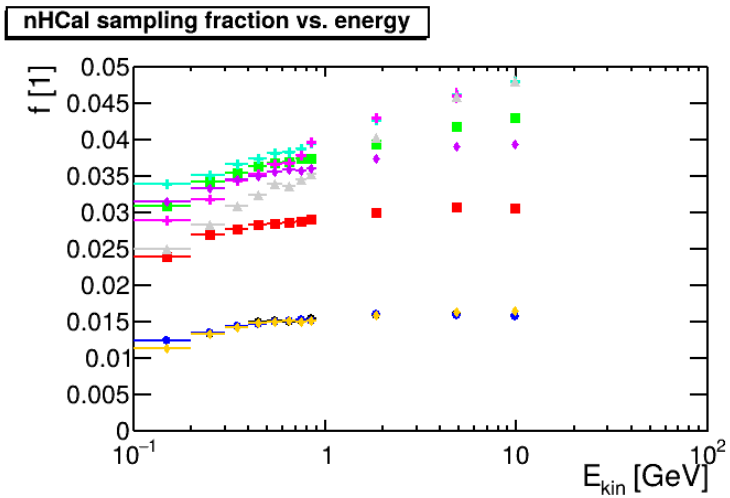
$$f_s = \frac{\sum E_{scint}}{E_k}$$

- 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

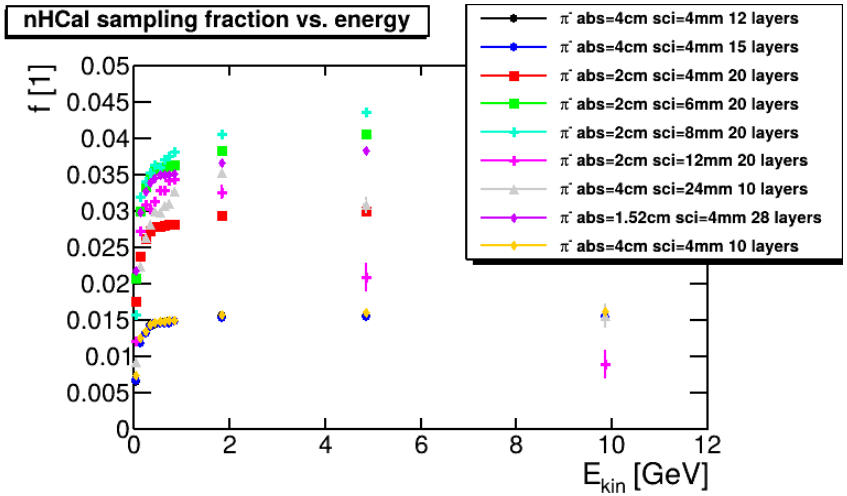
Sampling fraction - pions

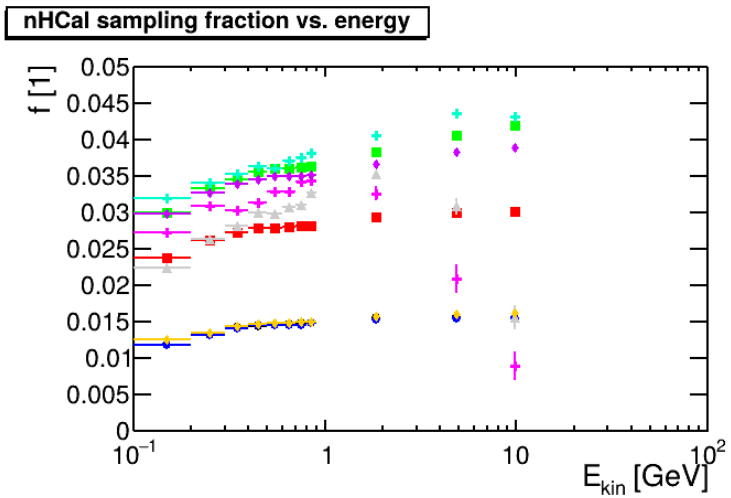
Perpendicular





Full acceptance

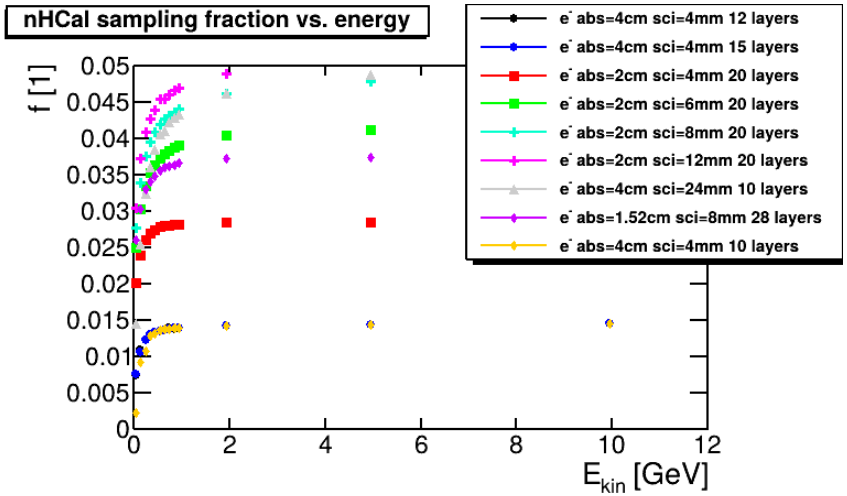


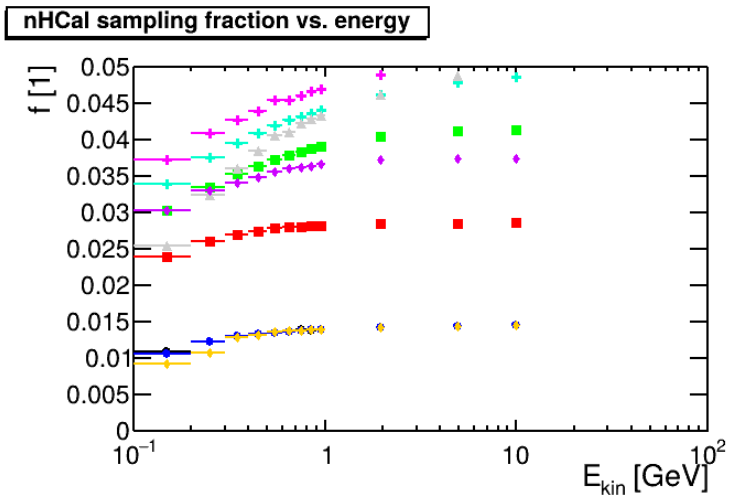


- Strange drop for 24 mm and 12 mm thick tiles (leakage?)

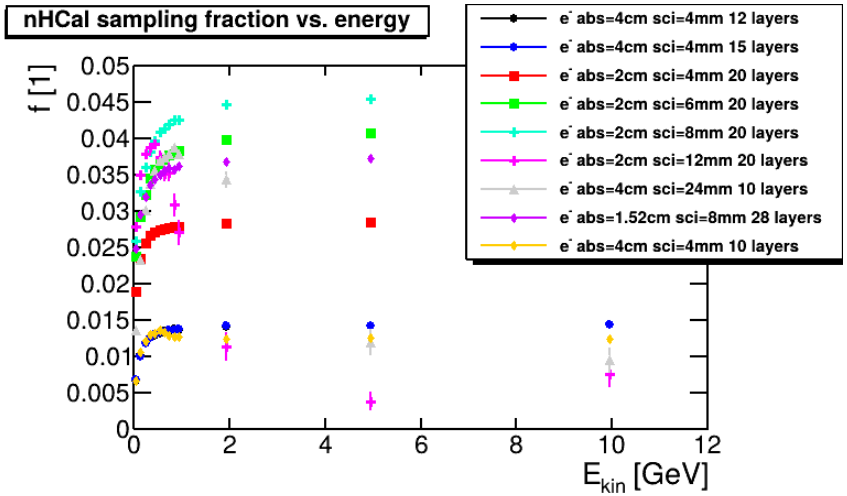
Sampling fraction - electrons

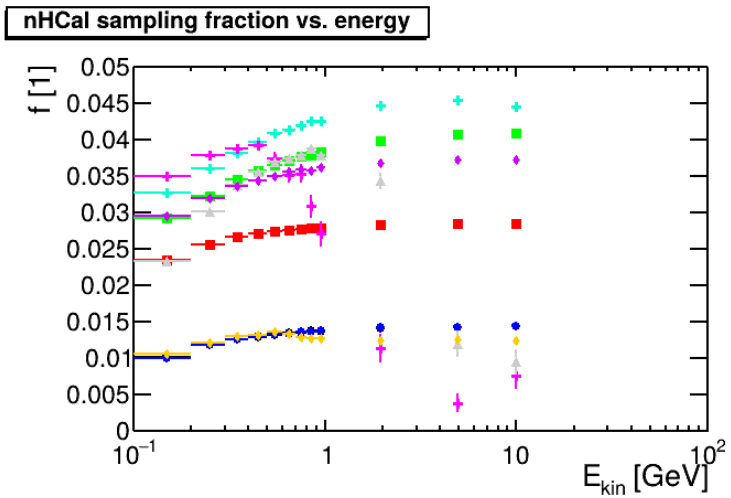
Perpendicular





Full acceptance





- Strange drop for 24 mm and 12 mm thick tiles (leakage?)

Summary

- Recalculated sampling fraction for almost full acceptance
- Strange drop for 24 mm and 12 mm thick tiles

BACKUP