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Recoil Tagging to Access Π Structure Functions

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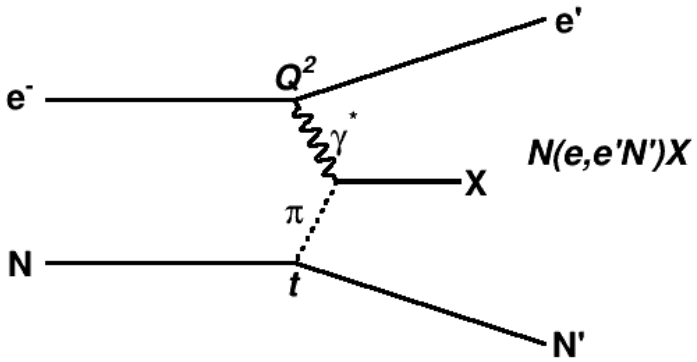

- Access Pion structure function by *N(e,e'N')X*
- DIS from pion cloud of nucleon
- Low -t (<0.2 (GeV/c)^2) essential to extrapolate reliably towards pion pole
- Recoiling nucleon has low momentum ~100 MeV/c (T ~ 5 MeV)
- Recoil tagging requires specialist, low-stopping-power spectrometer
  e.g. BONUS, Hall-B
- What luminosity could be achieved ?

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Recoil Proton Spectrometer: Radial-Field TPC
A Toy Geant-4 Model

Gas H_2/D_2 Target, 77° K, ~4 atm

Container 12 μm Kapton

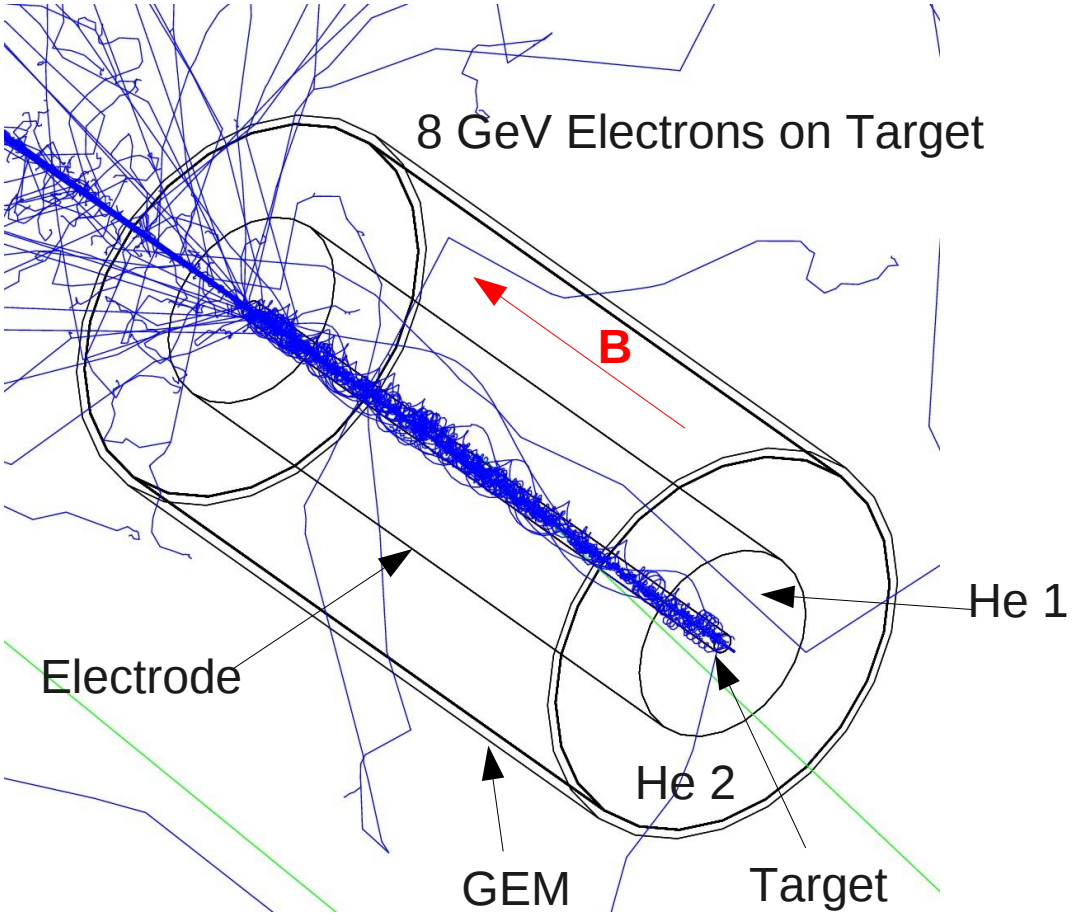
400mm long × 10mm Ø

I_e = 50 μA, L_N ~ 10^{37}

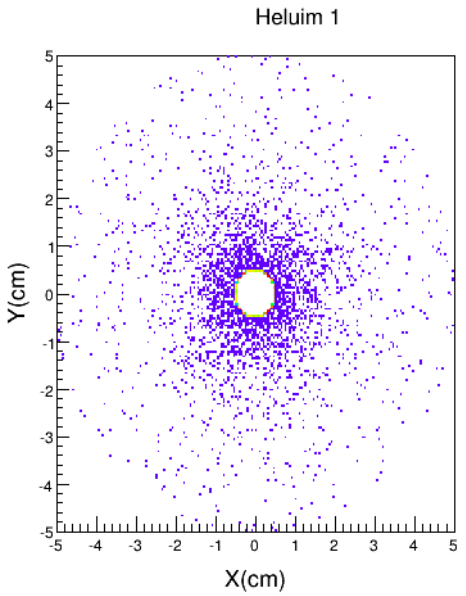
He gas 77° K, 0.1 atm
Drift electrode at r = 50 mm
Divides He volume in 2
r = 5 - 50mm, r = 50 - 100mm

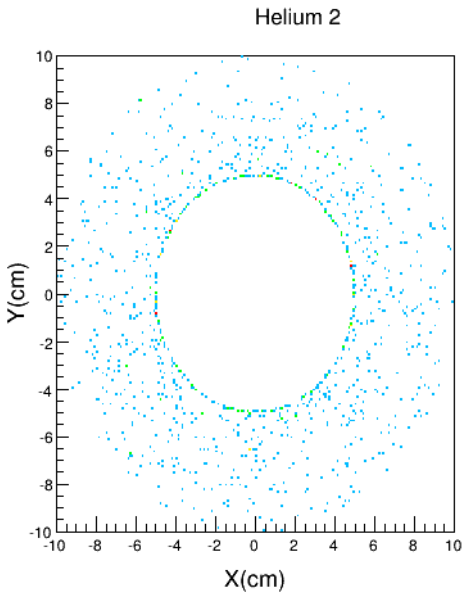
Outer cylindrical GEM
No detail coded yet

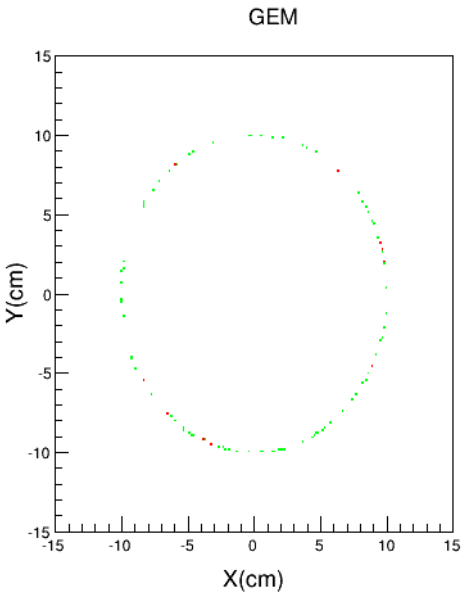
5 kG longitudinal magnetic field
assumed uniform

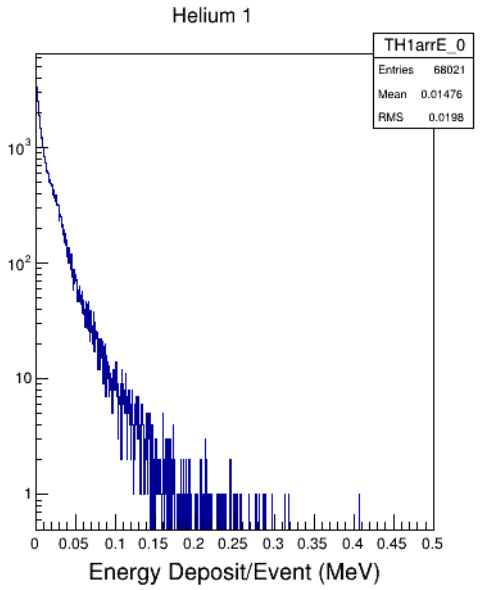


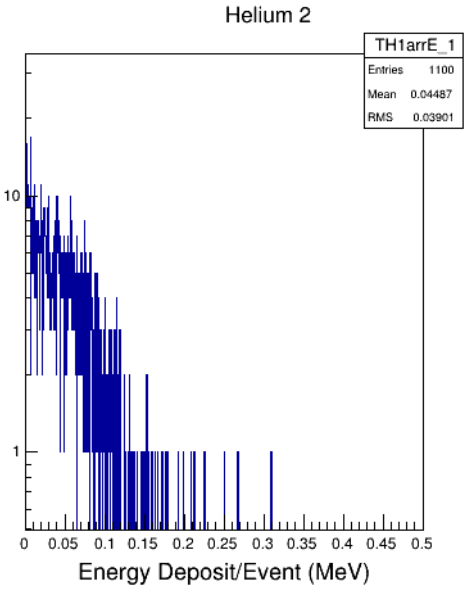
Distributions of Möller Event
10^6 8-GeV Electrons on Target

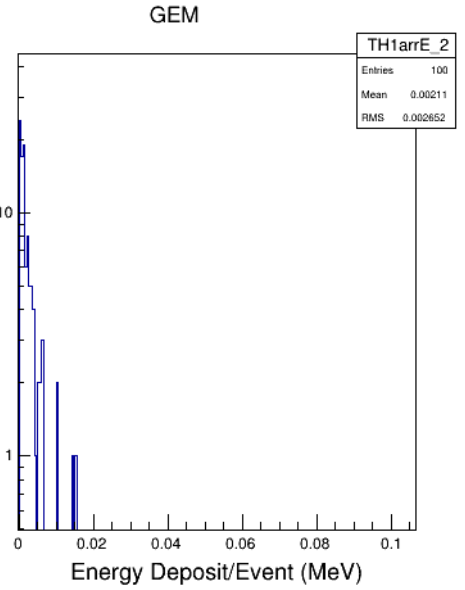




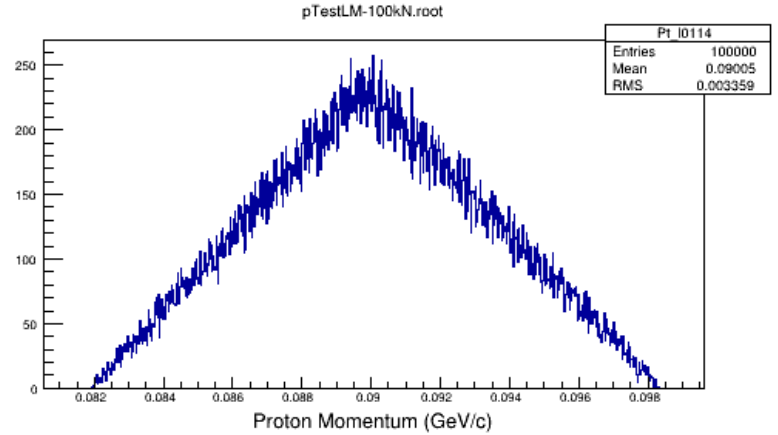


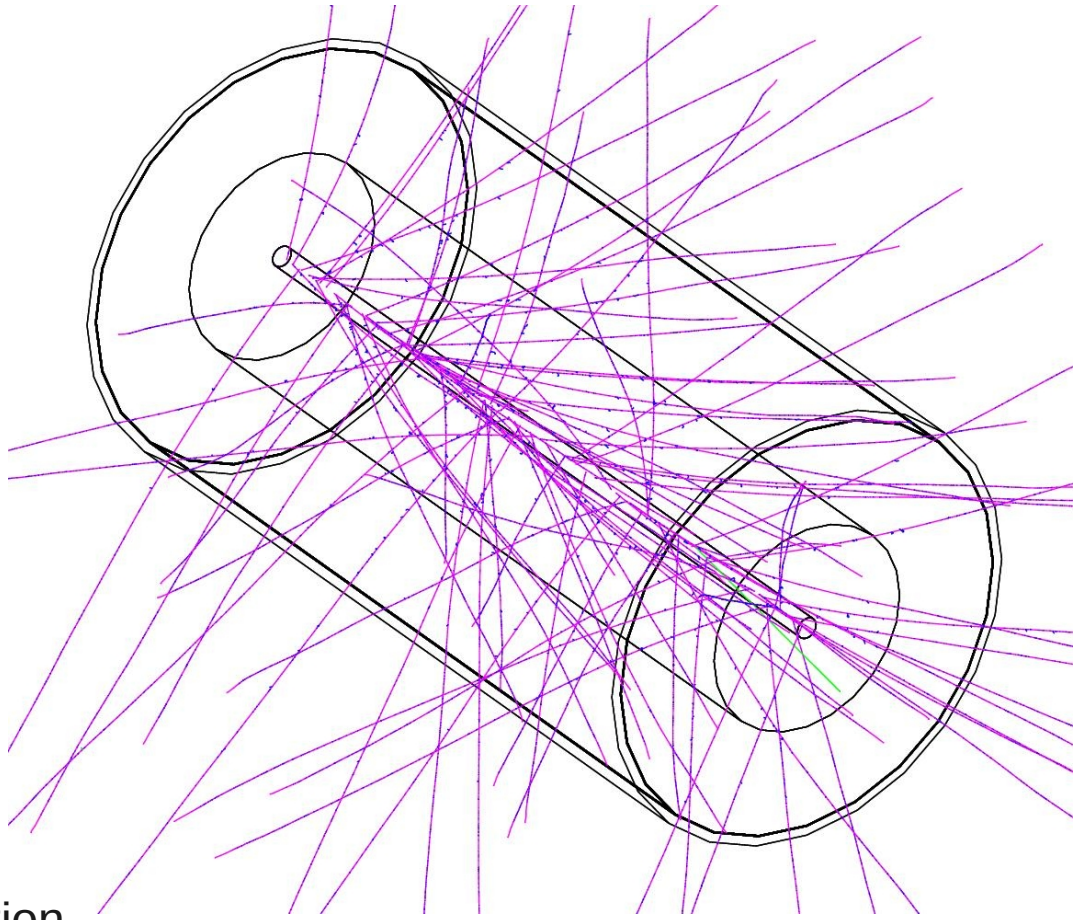






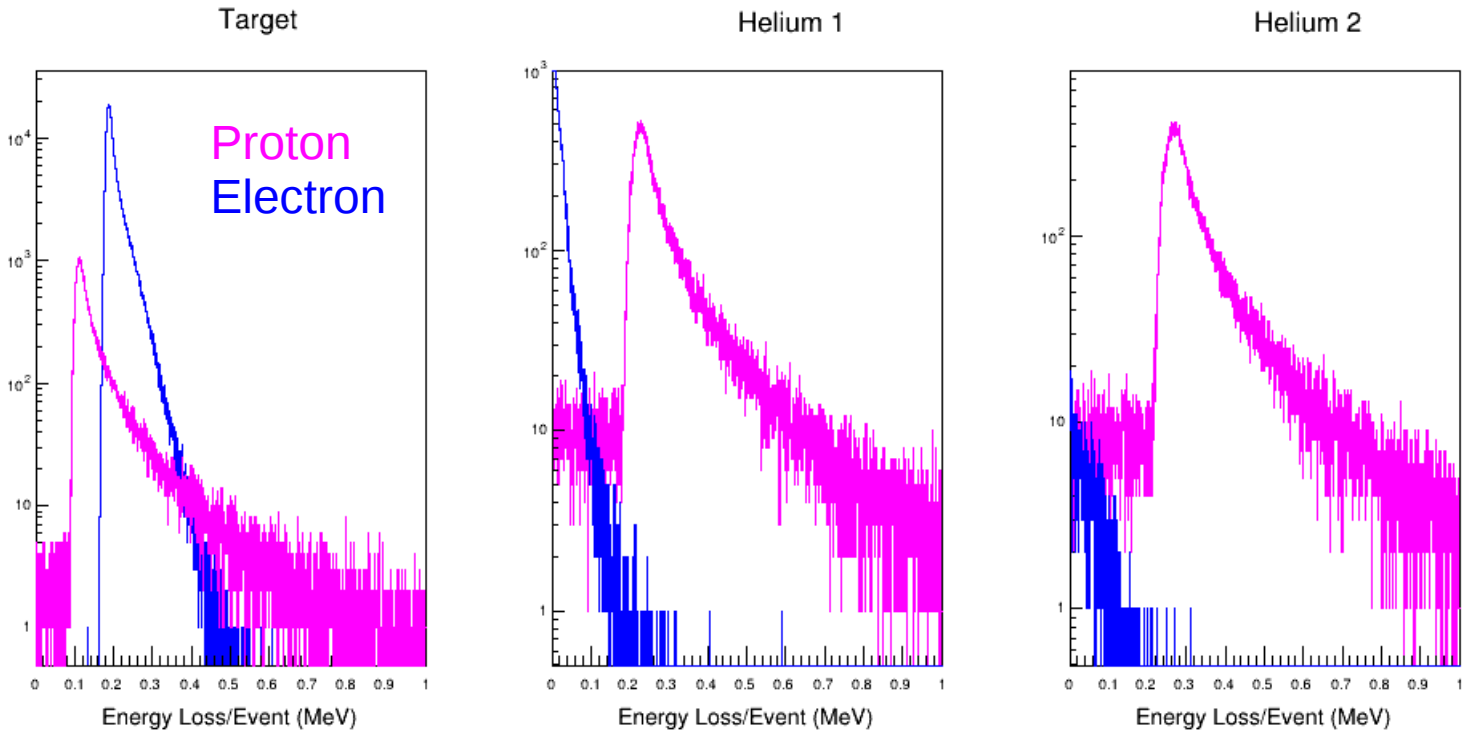
Low Momentum Protons





Proton kinematics a rough approximation

Proton + Möller Energy Deposit



Relative proton/electron intensities are not realistic

Toy model is just a start...
Model can be extended & refined