Hyperon reconstruction in Xe run

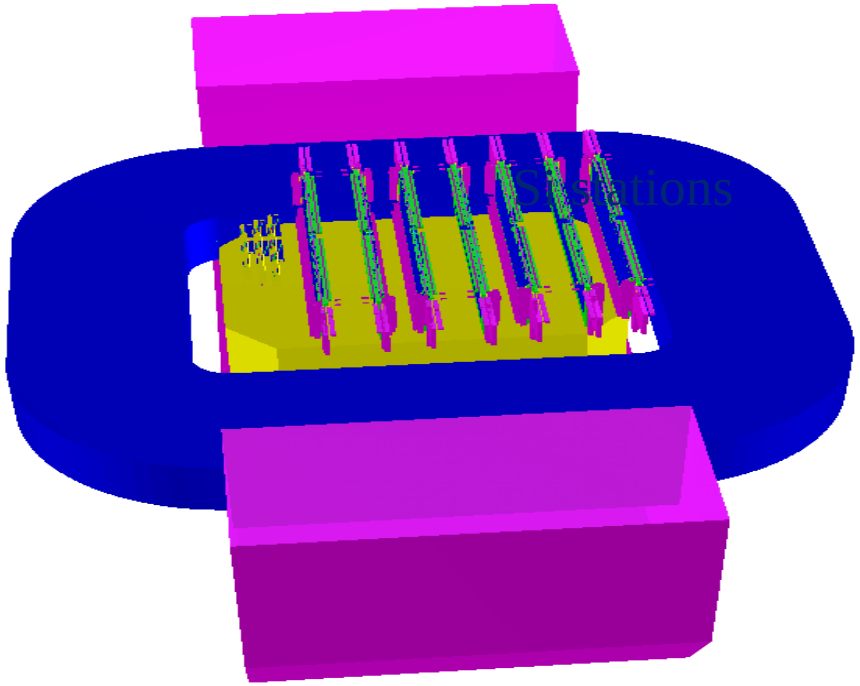
V.Vasendina, A.Zinchenko, D.Zinchenko
VBLHEP, JINR, Dubna, Russia

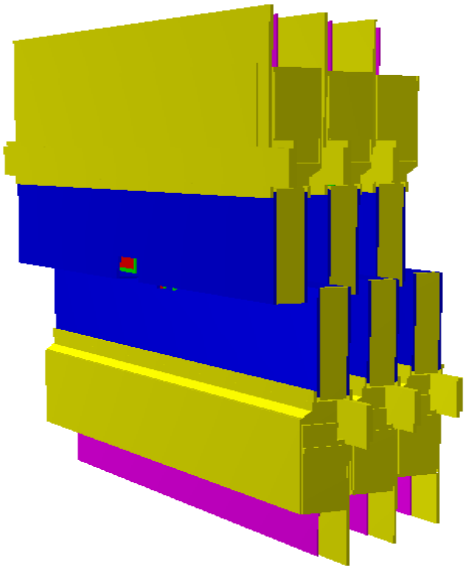
The 9-th BM@N Collaboration Meeting
13 - 16 September 2022, LHEP, JINR

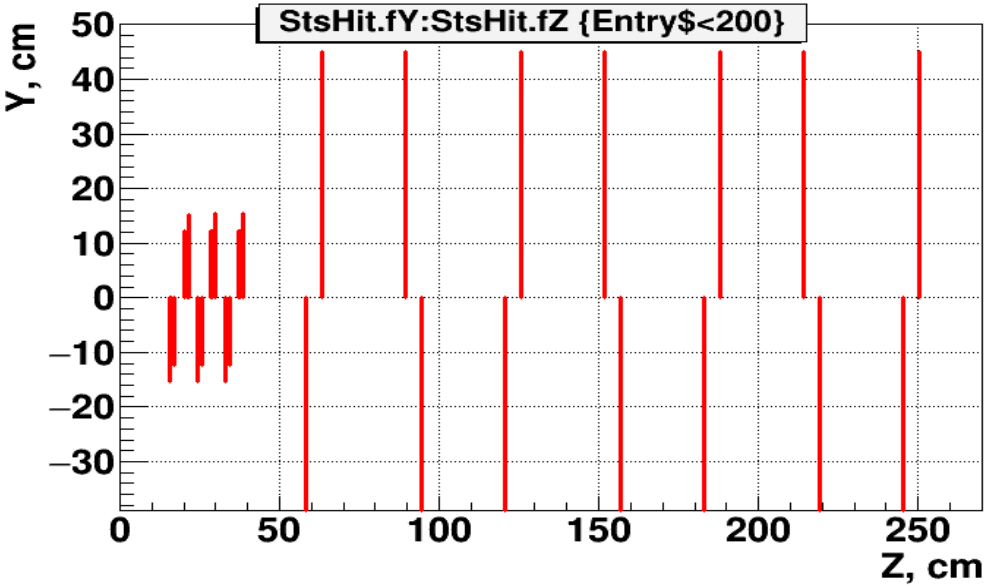
Outline

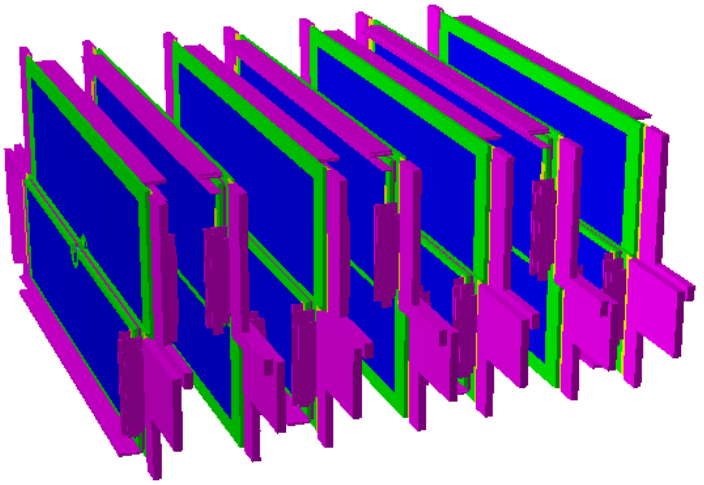
- ✓ BM@N configuration
- ✓ Event samples
- ✓ Track reconstruction
- ✓ MC simulations for Run 8 (Xe+CsI):
  - ✓ Λ reconstruction at 1.5 GeV
  - ✓ Λ reconstruction at 2.9 GeV
  - ✓ Λ and Ξ^- reconstruction at 3.9 GeV
- ✓ Summary and next steps

Detector geometry in Run 8









Data set in Run 8

Detectors: Si (3 stations) + GEMs (7 stations)

Generator: DCM-SMM, min. bias Xe+CsI at

T_0 = 1.5A GeV ($\sqrt{s_{NN}}$ = 2.521 GeV) – B = 4 kG

T_0 = 2.9A GeV ($\sqrt{s_{NN}}$ = 2.998 GeV) – B = 6 kG

T_0 = 3.9A GeV ($\sqrt{s_{NN}}$ = 3.296 GeV) – B = 8 kG

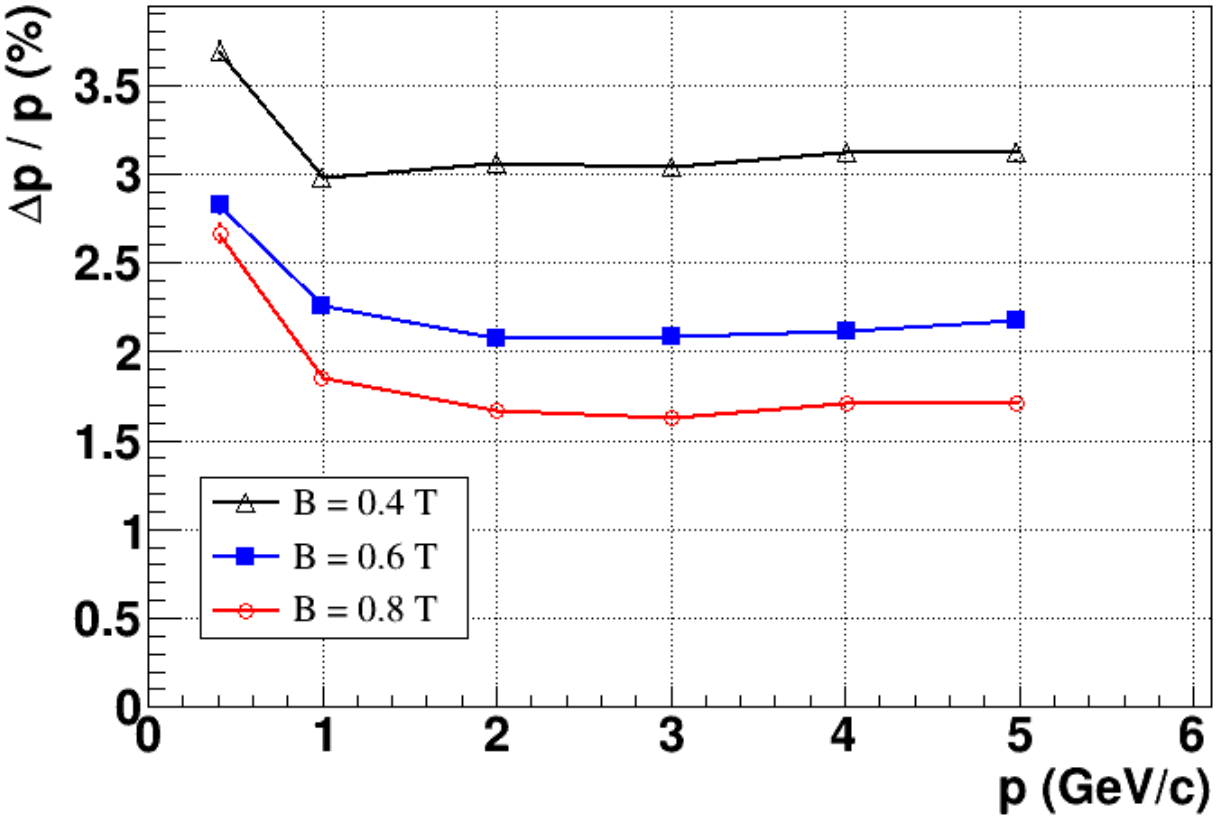
Statistics: Λ – 0.11/event at 1.5 GeV, 0.60/event at 2.9 GeV, 1.1/event at 3.9 GeV

Ξ^- – 0.012/event at 3.9 GeV

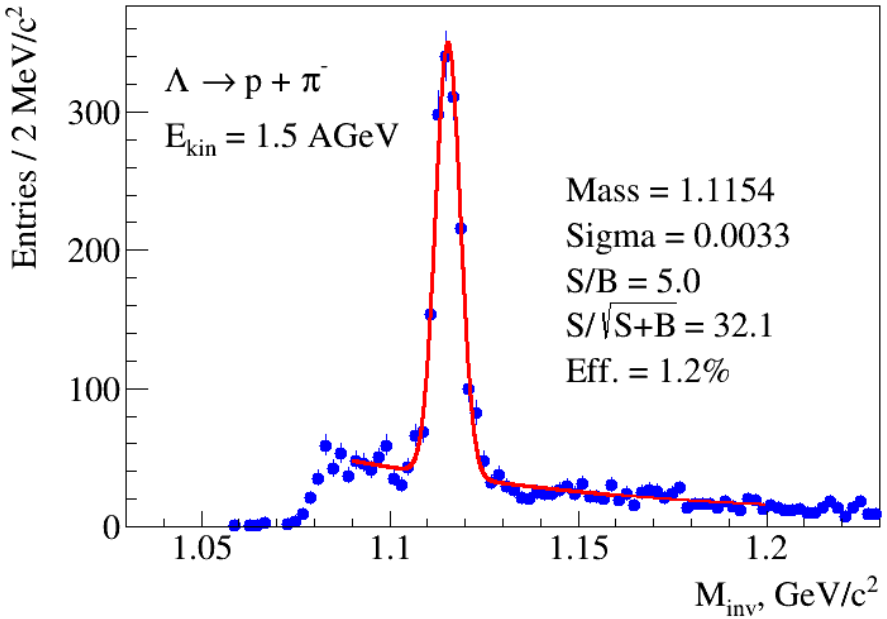
Track reconstruction

- ✓ CAT (L1) track reconstruction – legacy code from the CBM experiment
- ✓ Vector Finder (VF)– homemade (import substitution) package
- ✓ L1 demonstrates higher efficiency at 4 kG, VF at 6 and 8 kG

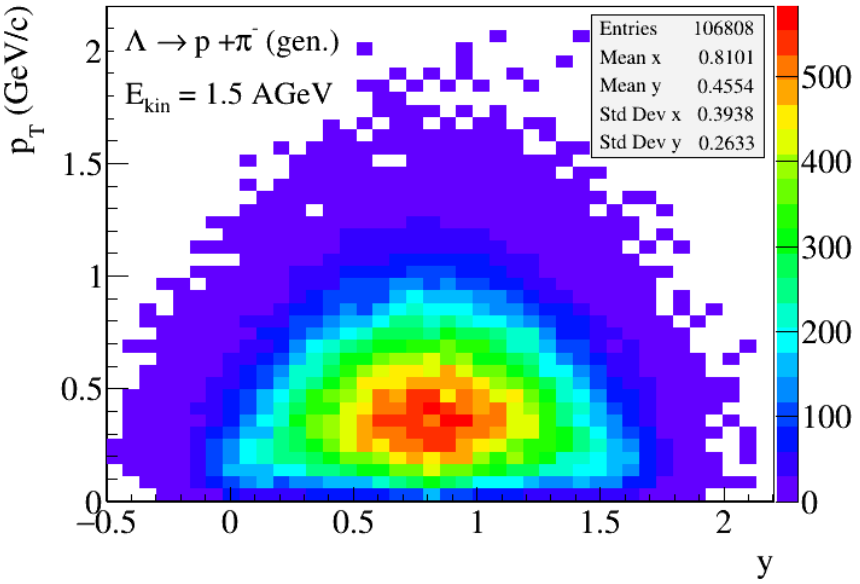
Tracker performance

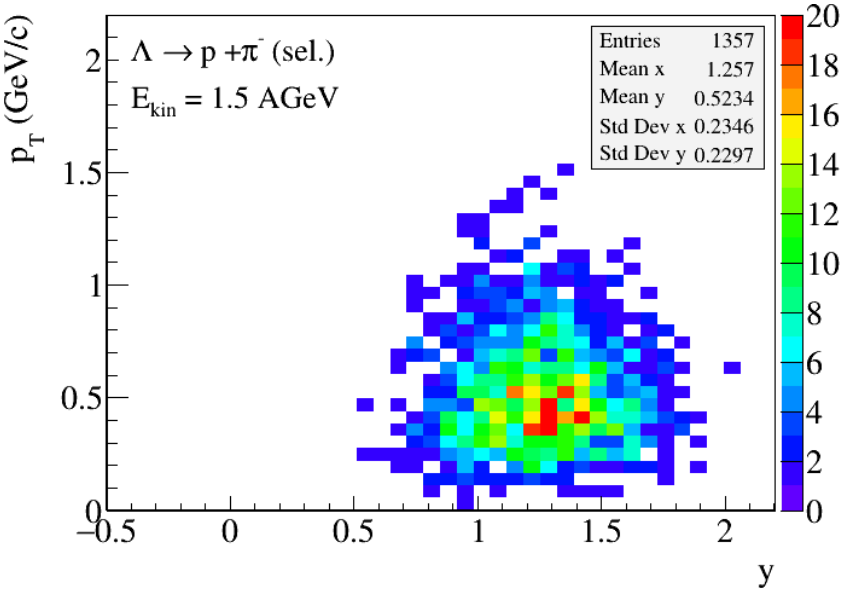


Λ reconstruction at 1.5 GeV

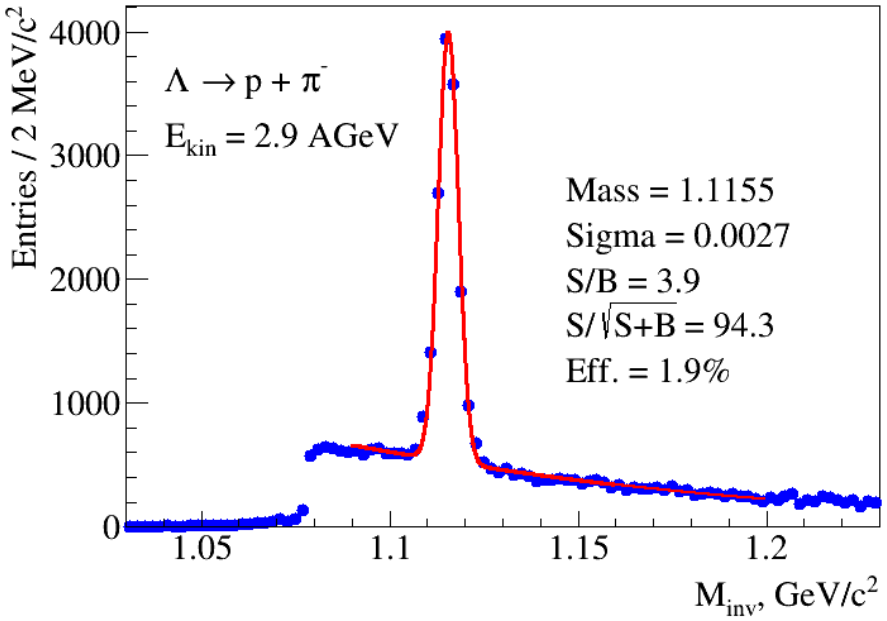


1M interactions

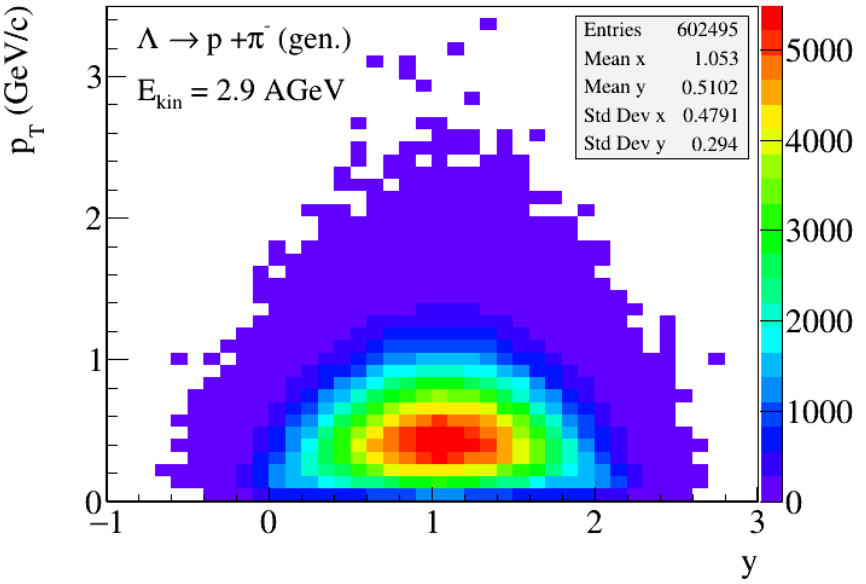


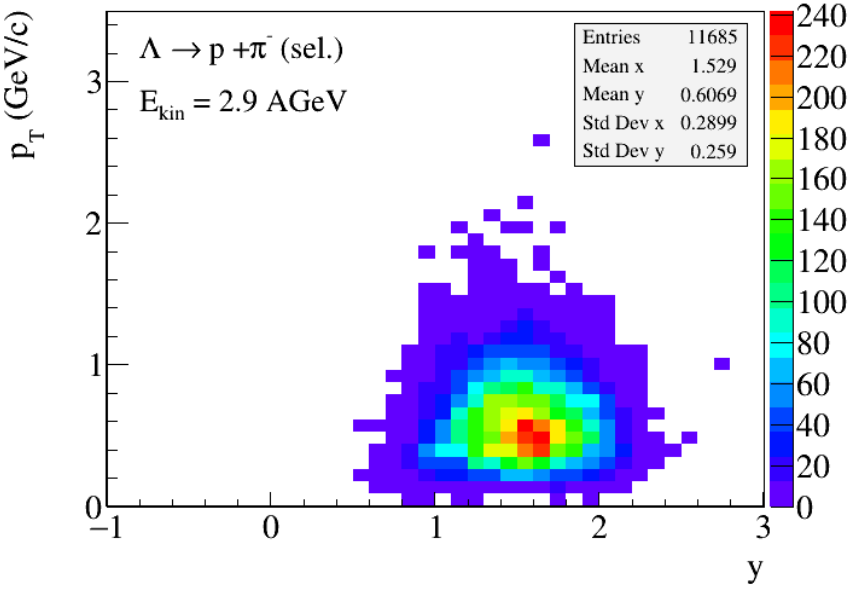


Λ reconstruction at 2.9 GeV

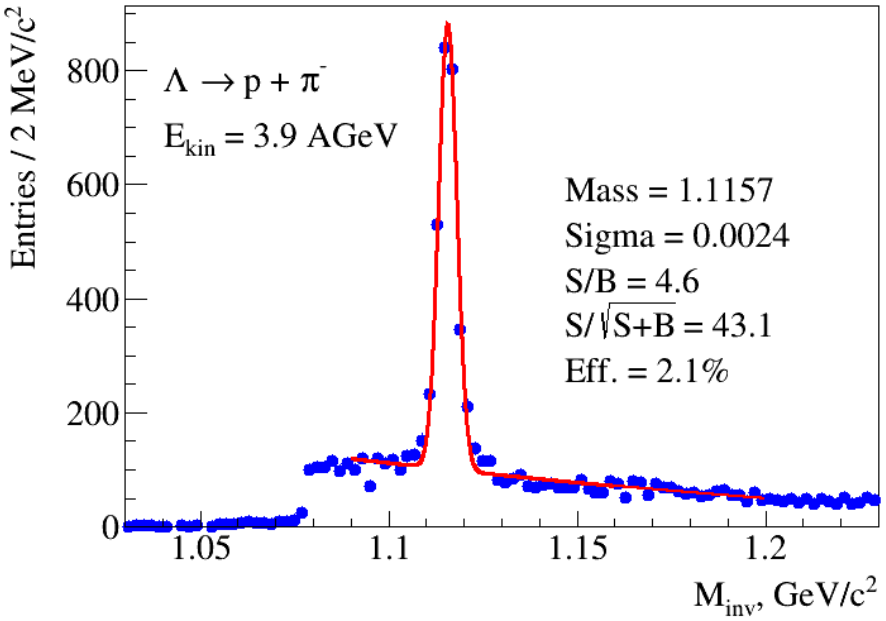


1M interactions

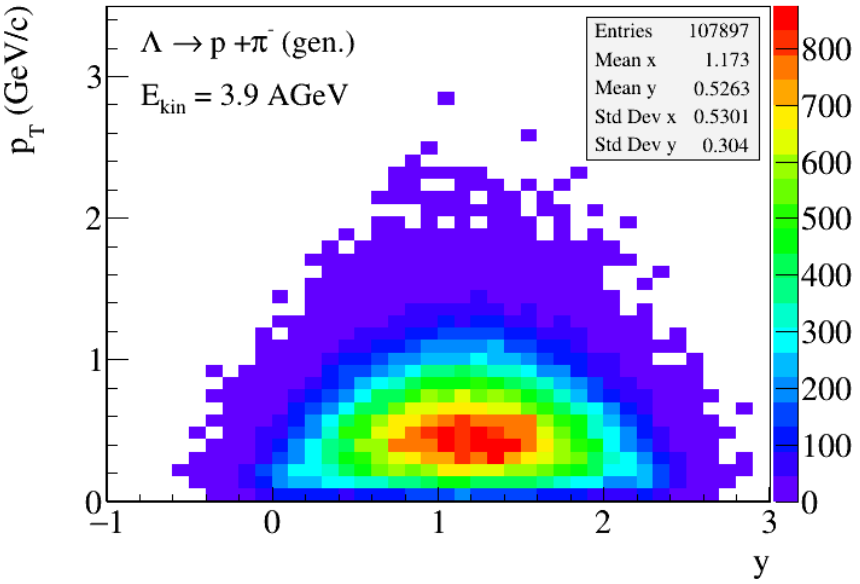


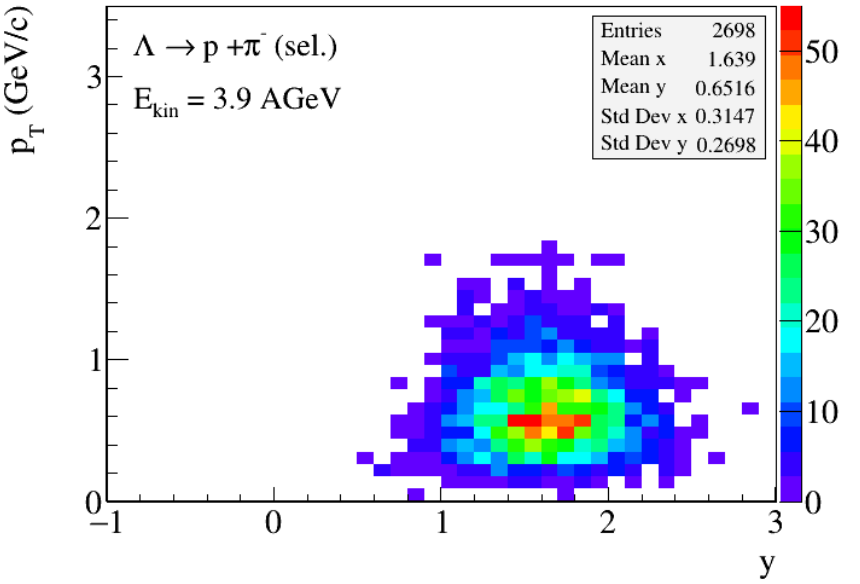


Λ reconstruction at 3.9 GeV

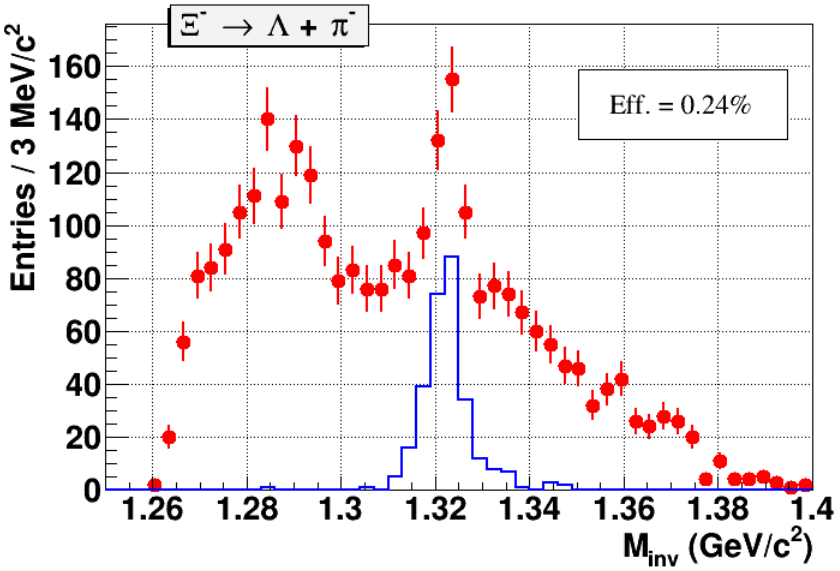


100k interactions

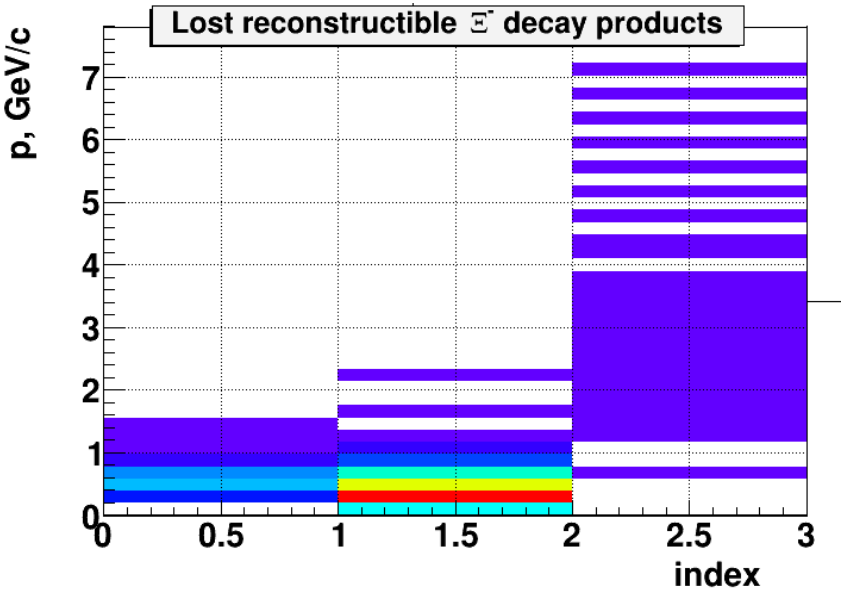


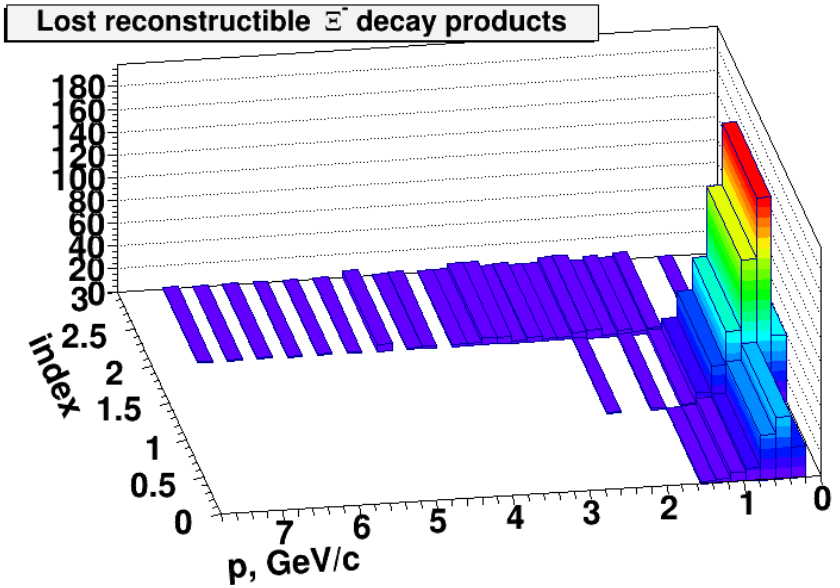


Ξ^- reconstruction at 3.9 GeV



10M interactions





Summary and next steps

- ✓ Hyperon reconstruction results have been shown using Monte Carlo simulated data for the BM@N detector with realistic configuration
- ✓ Machine learning techniques can be tried to improve track reconstruction efficiency in the Vector Finder procedure