Energy Loss Analysis

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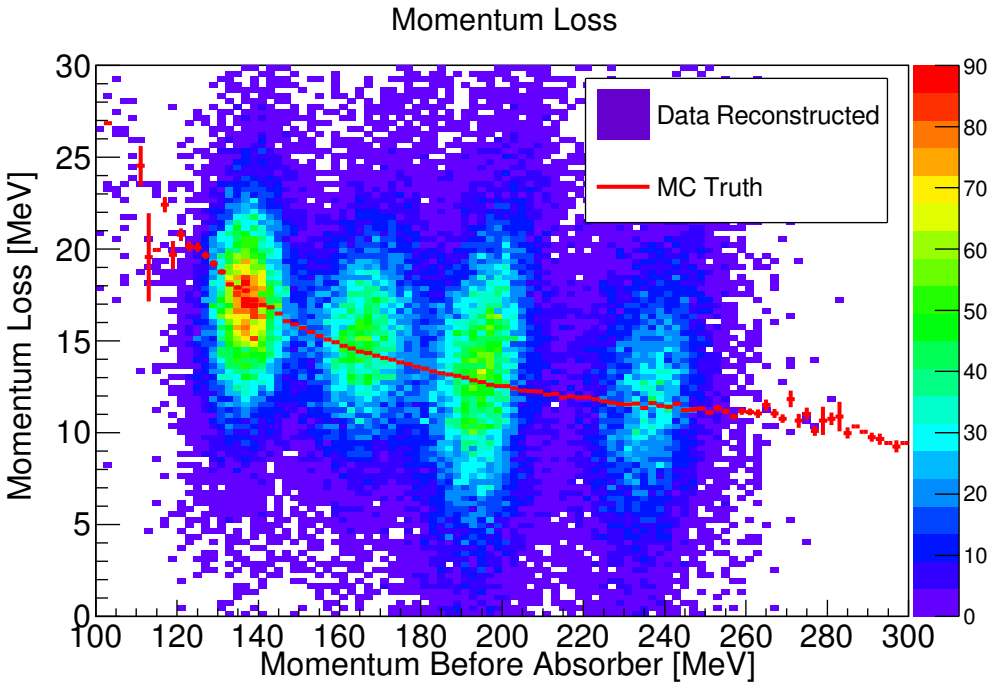
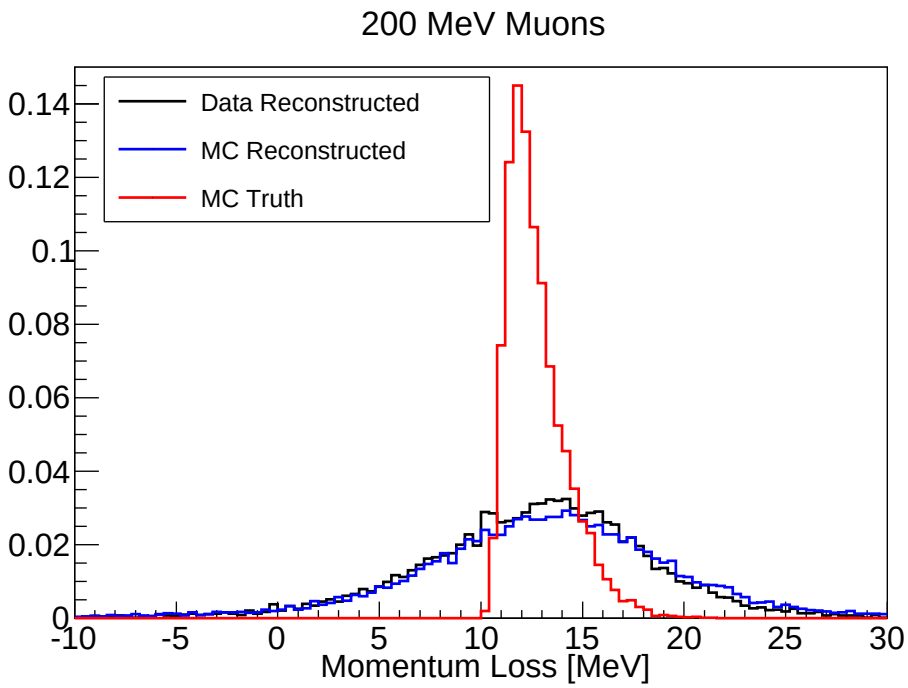
Momentum Loss Measurement



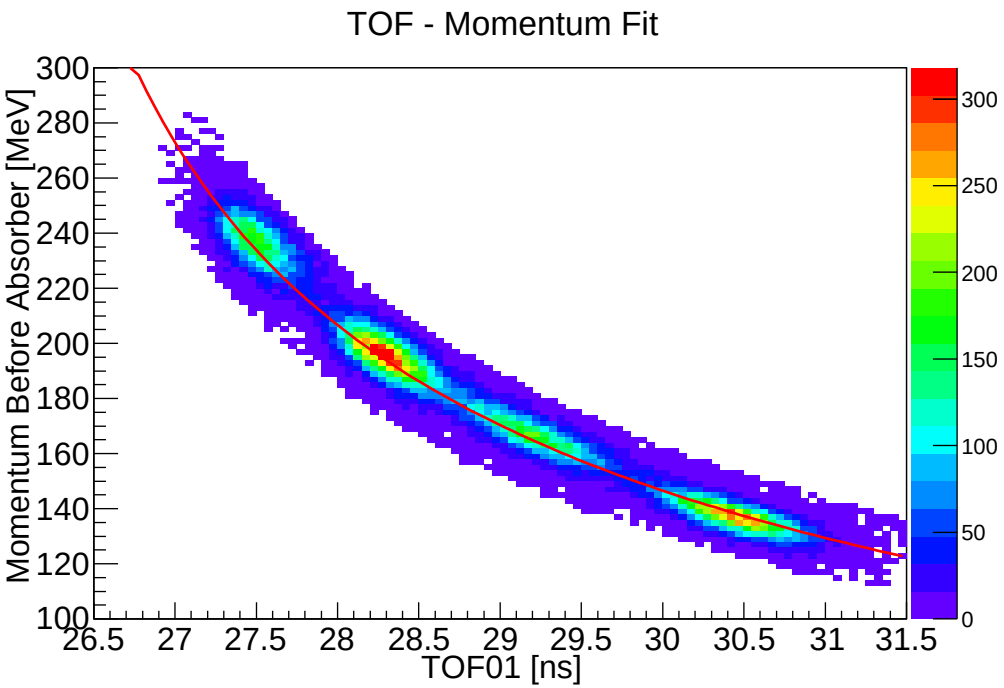


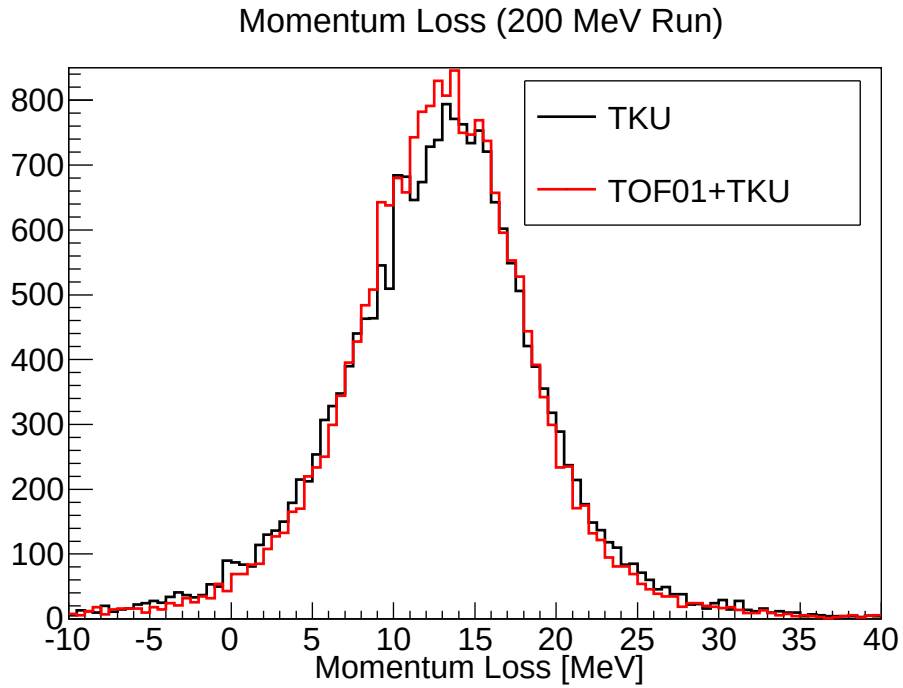
- With two working trackers, simple measurement is easy
- 200 MeV MC: (13.3 ± 5.9) MeV
  200 MeV Data: (12.8 ± 5.3) MeV
- Can improve upon this simple measurement

Sample Selection

- Exactly one helical track upstream and downstream
- Loose TOF01 - TKU cut to cut out pions and scraped muons
- $p_T/p > 0.1$ to ensure momentum is well-measured

Adding TOF



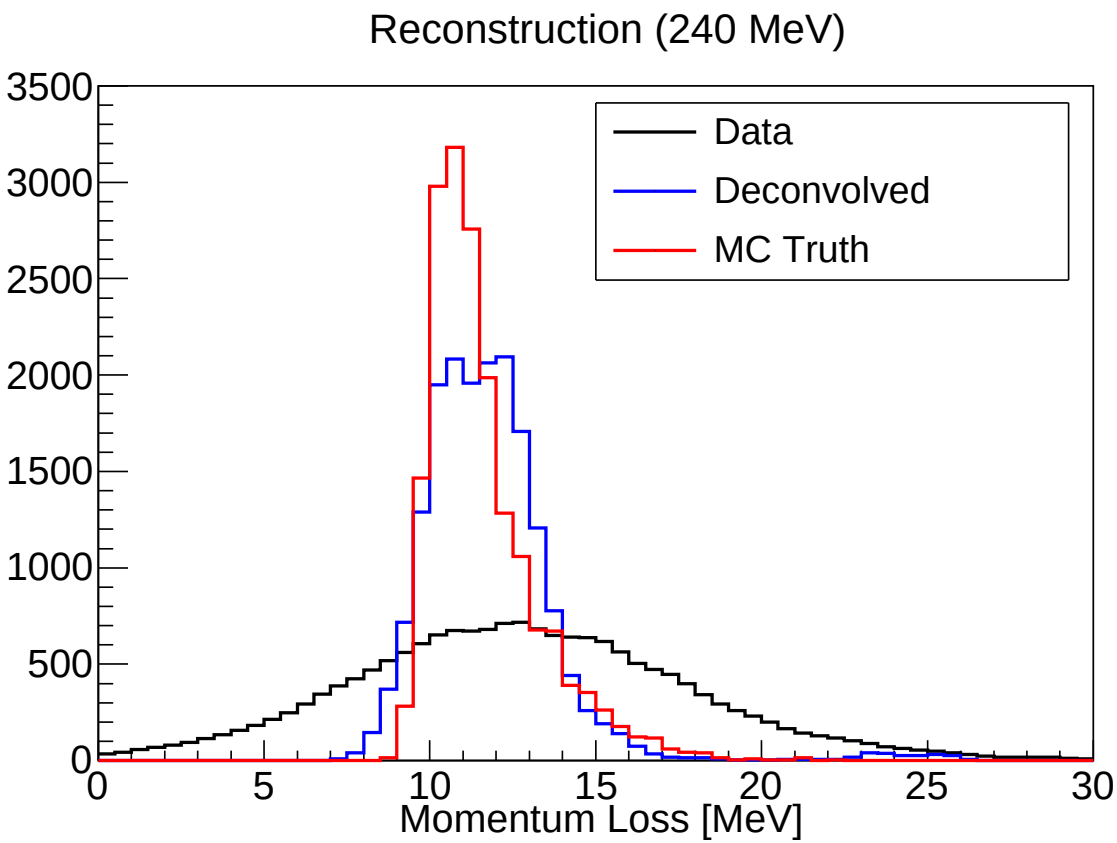


- TOF01 gives a momentum measurement with similar precision to the tracker
- Combining TOF and tracker measurements improves the upstream resolution

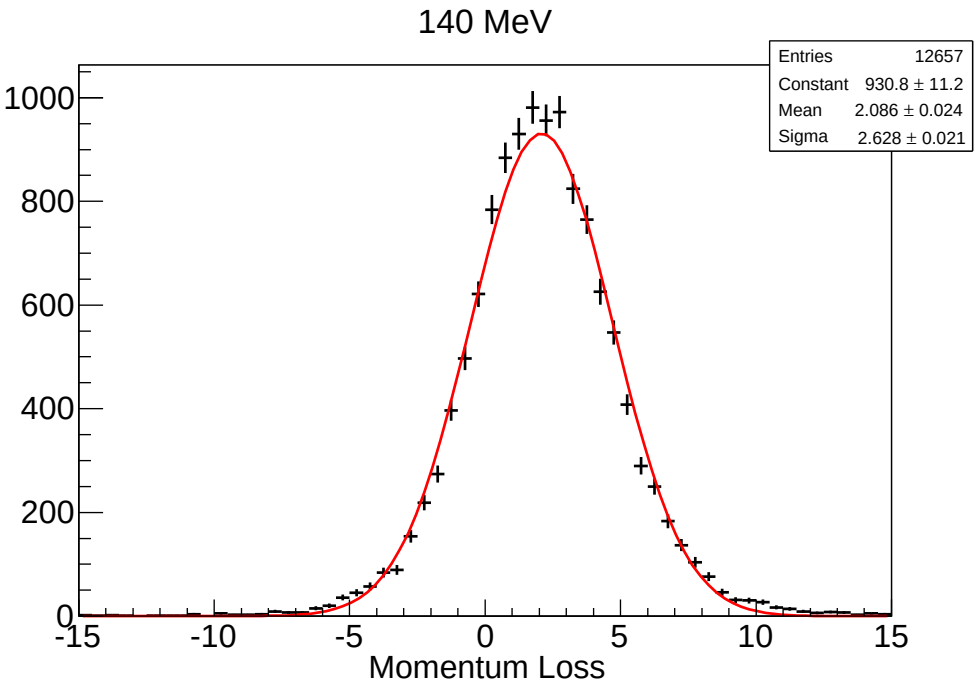
Convolution Fit

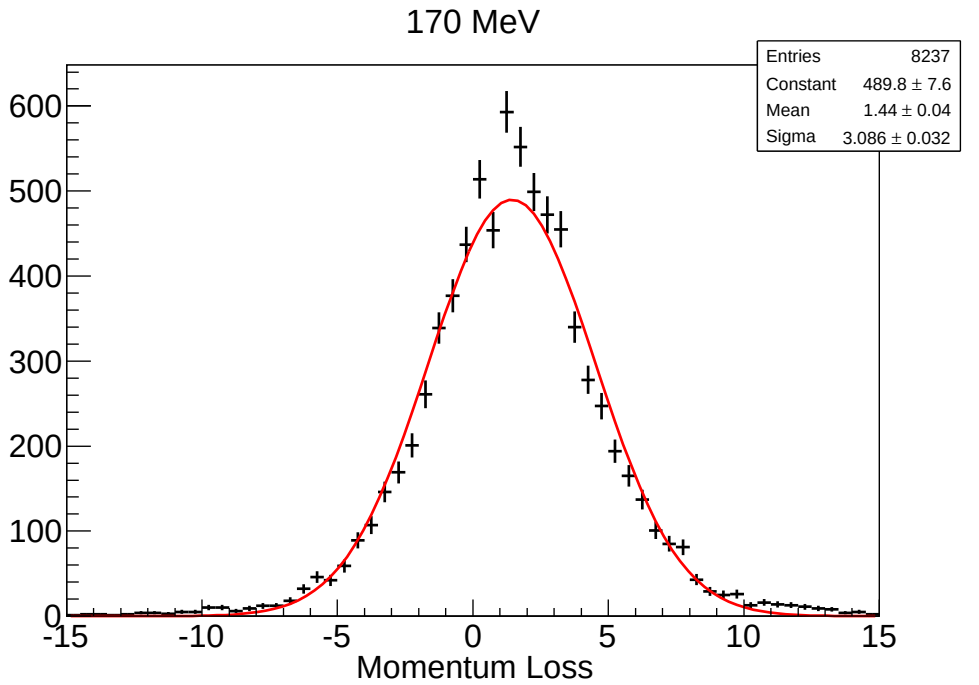
- Fit empty absorber data to find resolution
- Fit LiH absorber data to convolution of landau (free parameters) and gaussian (from empty fit)
- Improved results compared to deconvolution

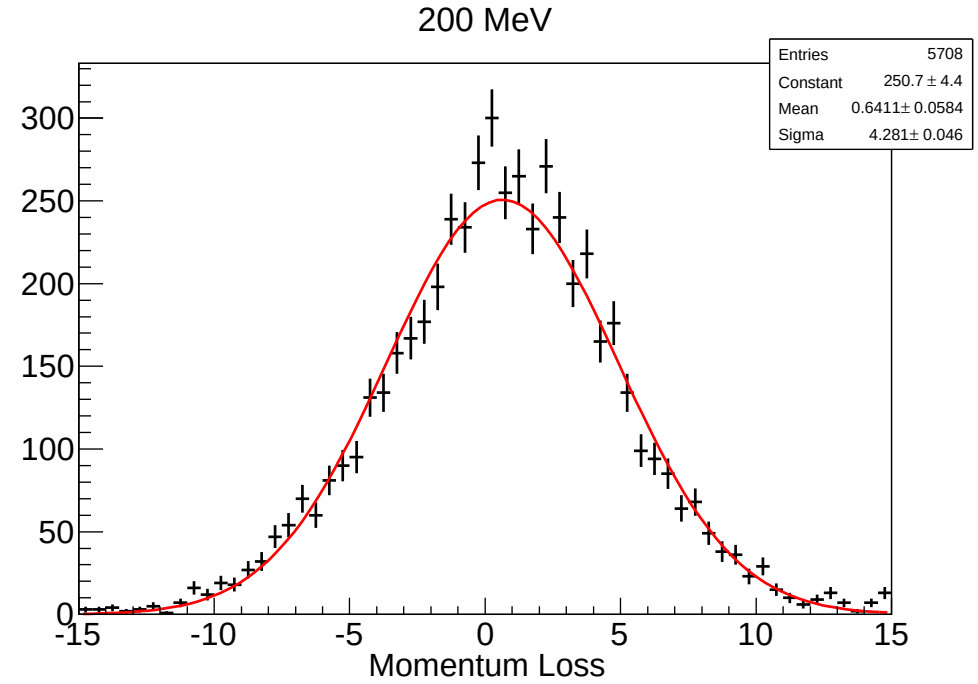
Old:

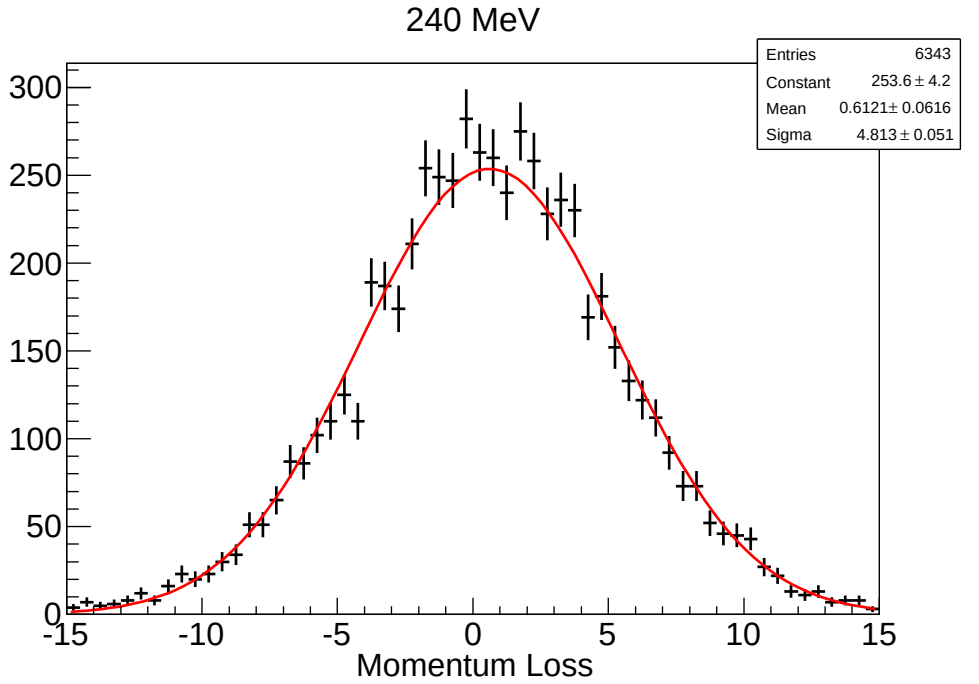


Empty Absorber Fits

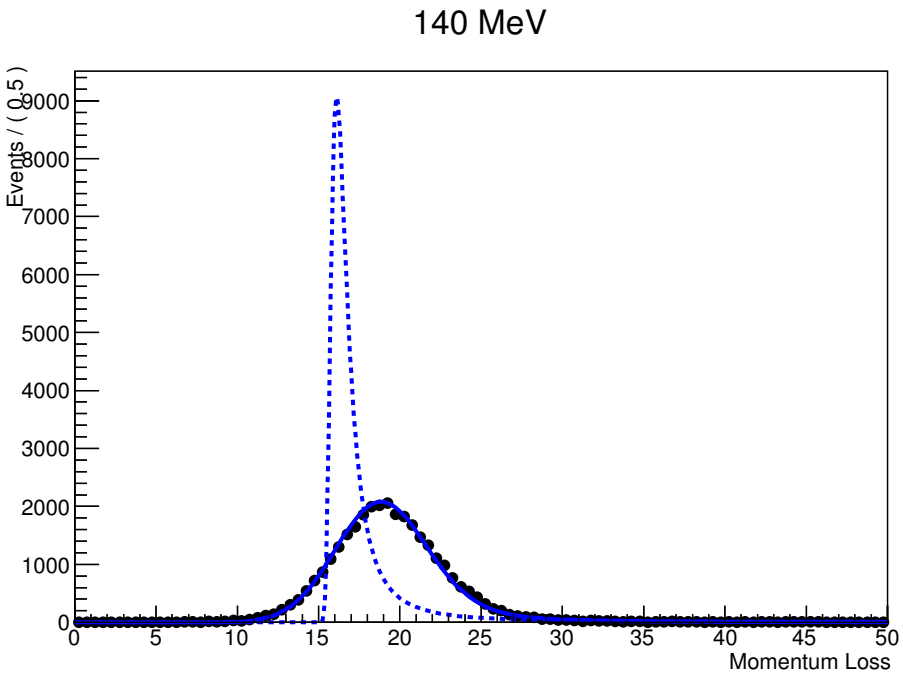


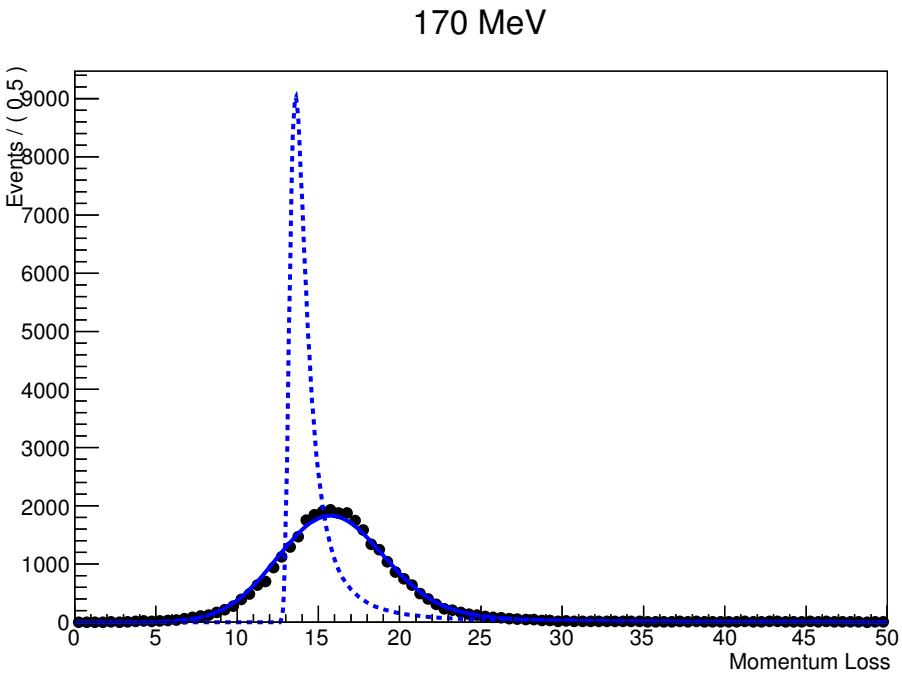


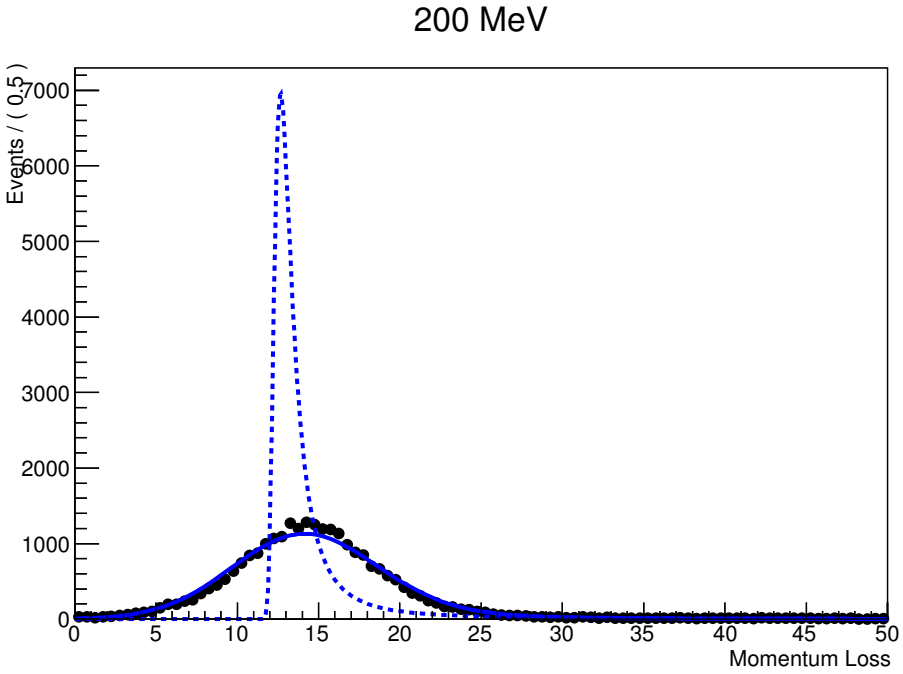


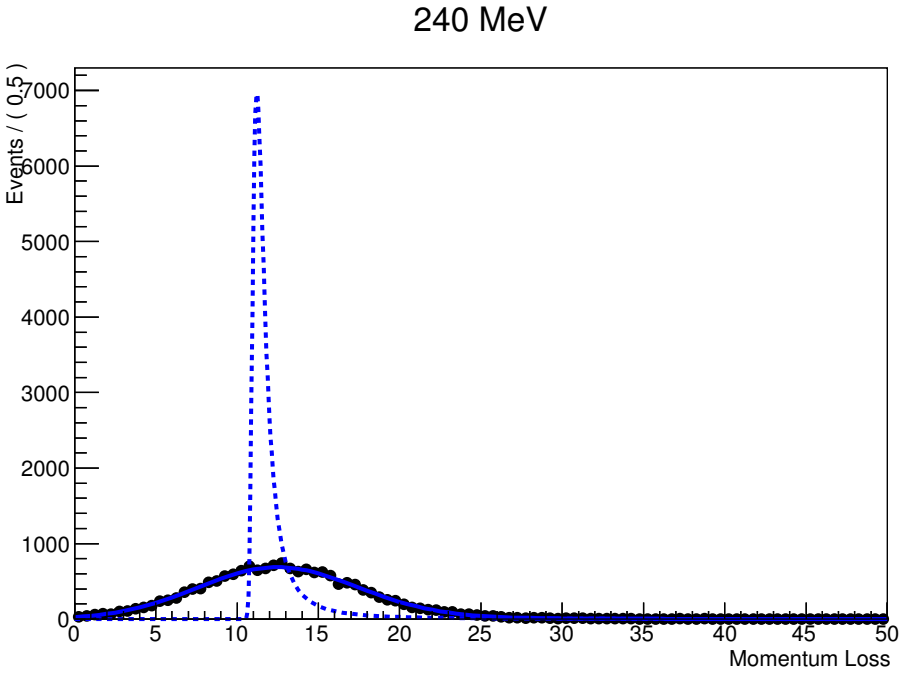


Convolved Energy Loss Fits

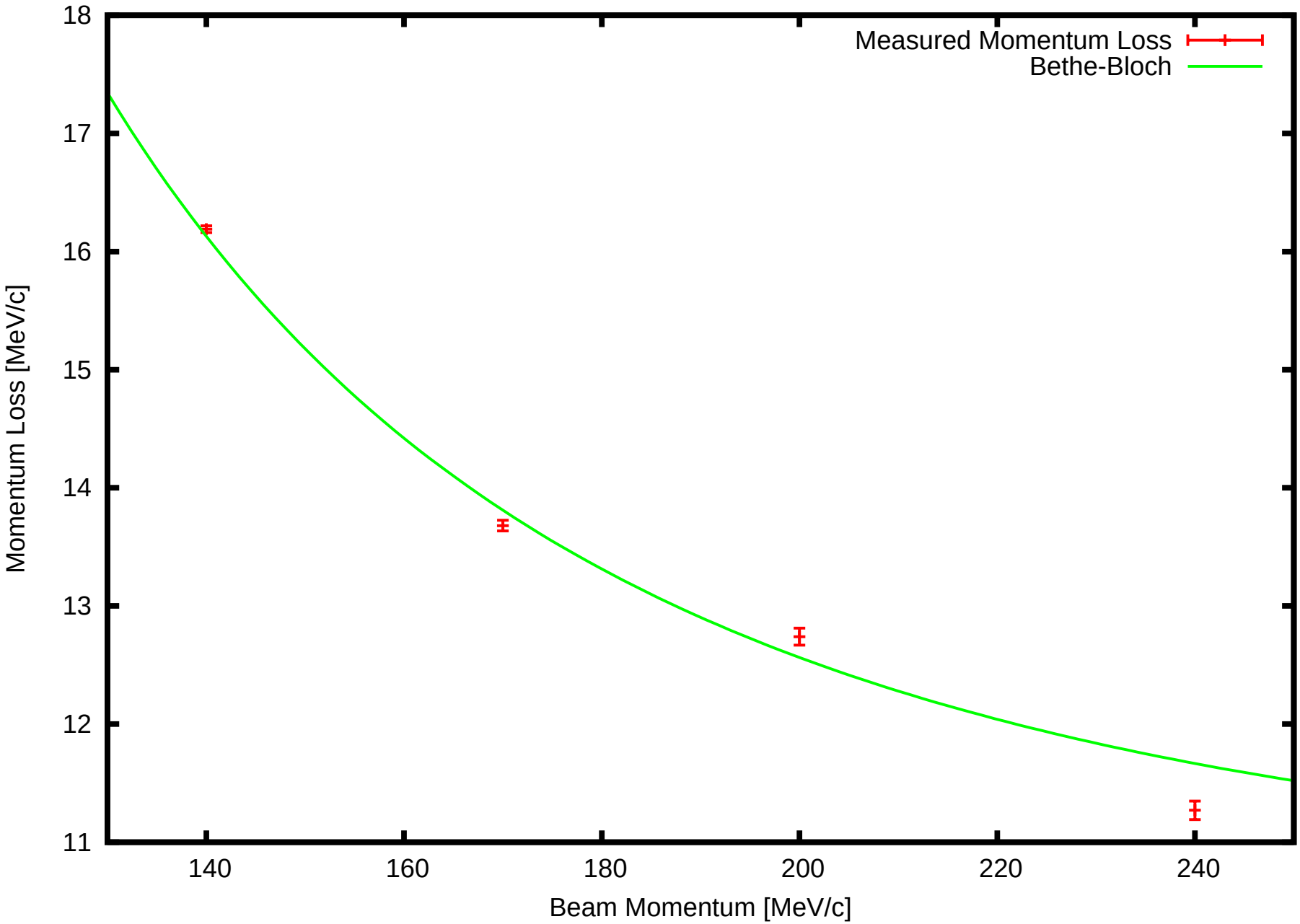




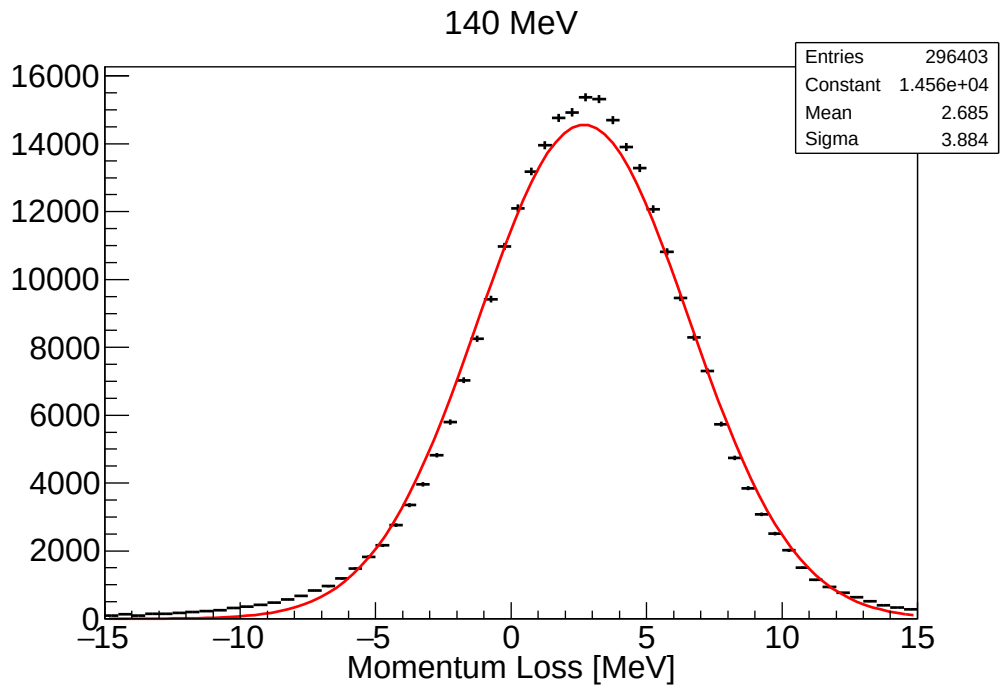


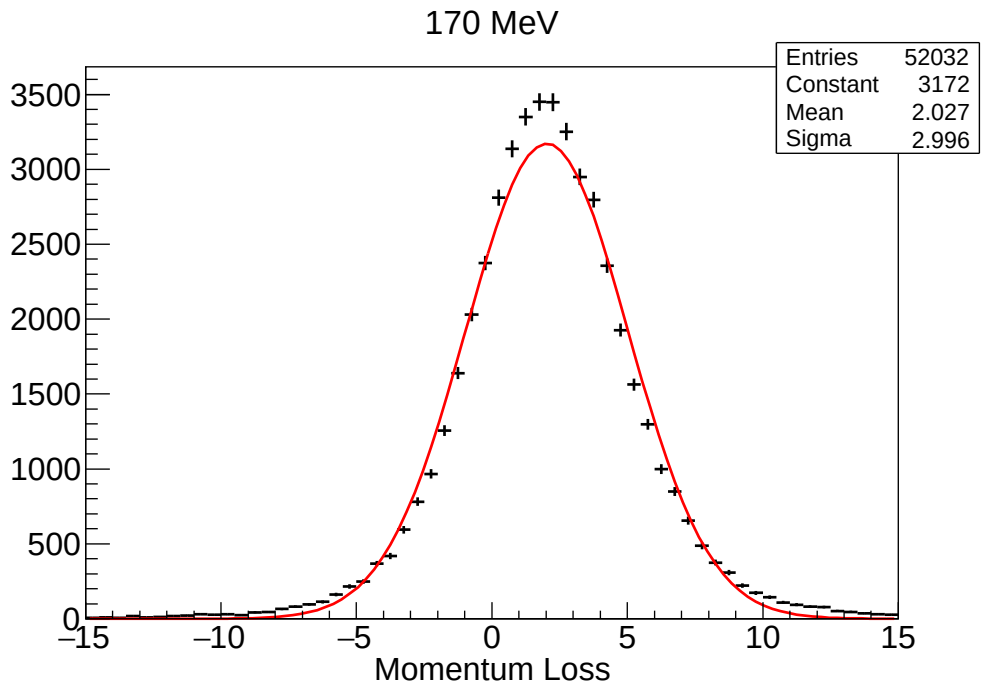


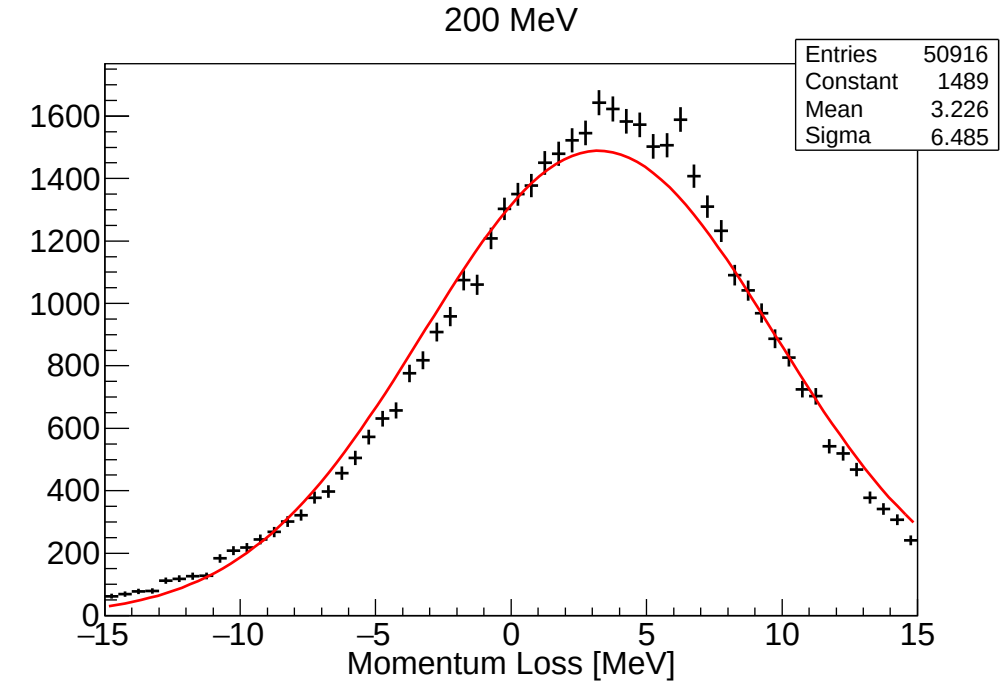
Comparison to Theory

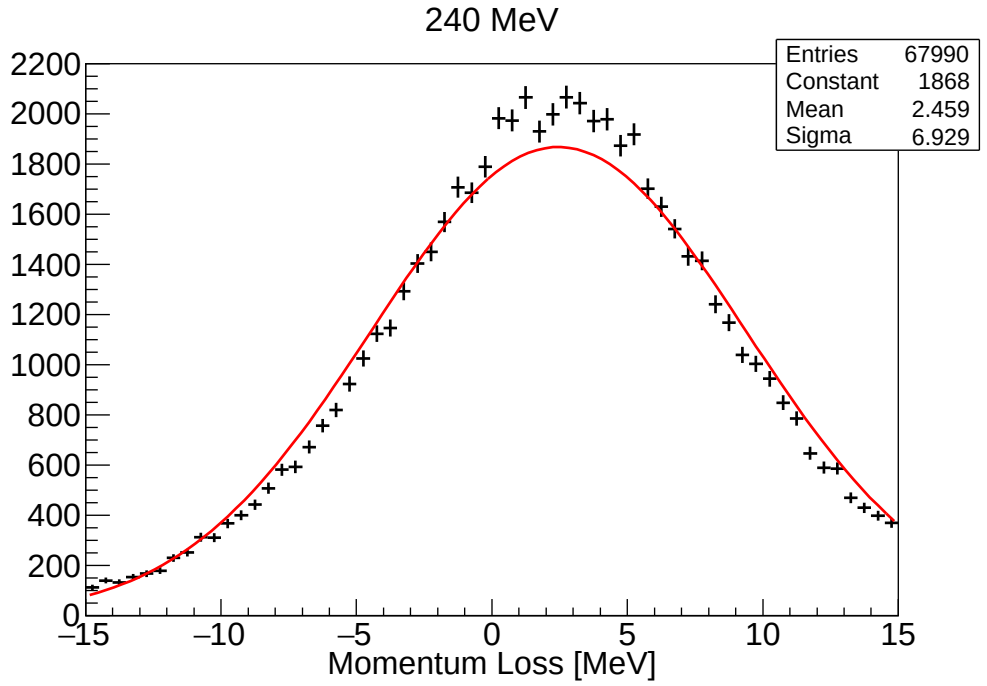


LH_2 Empty Data



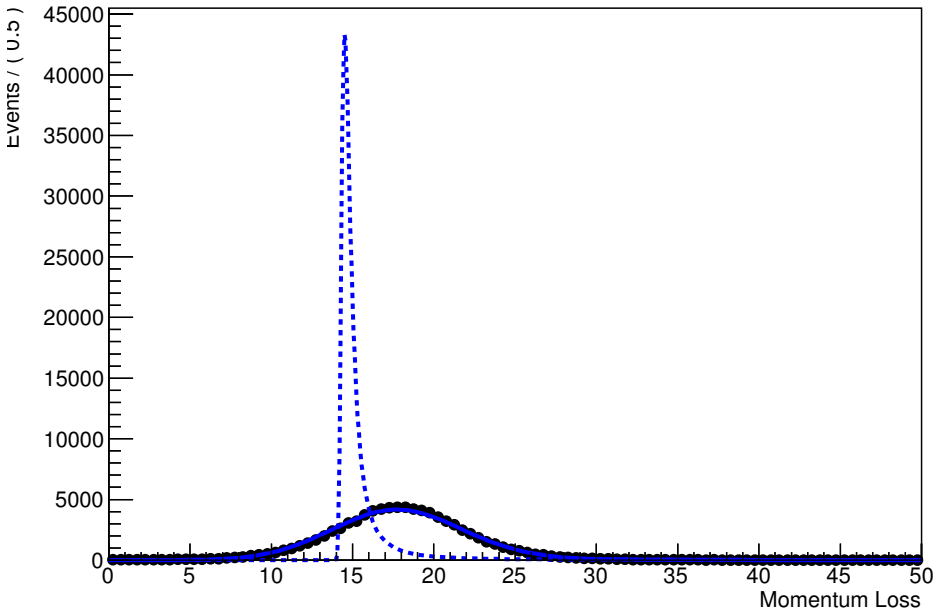




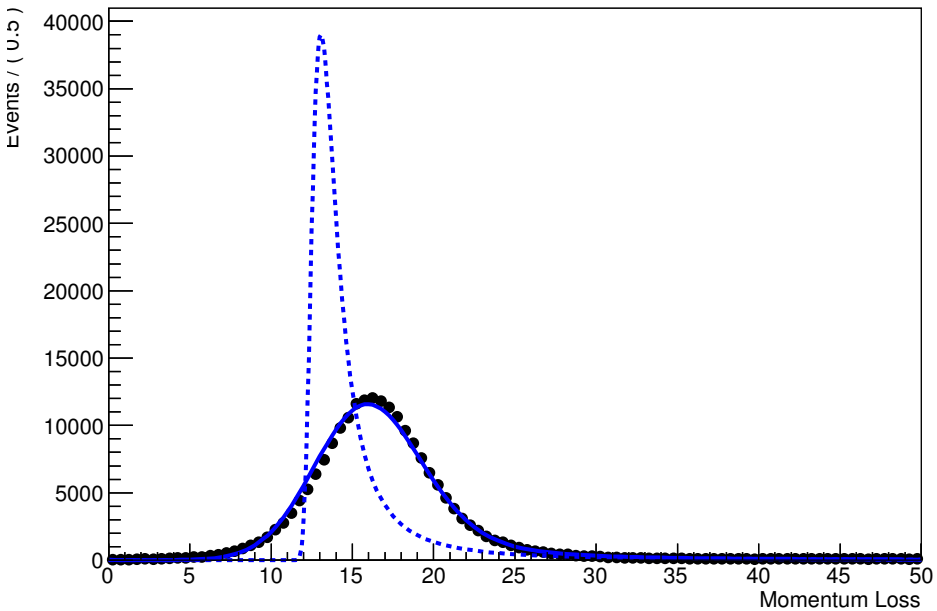


LH_2 Convolved Fits

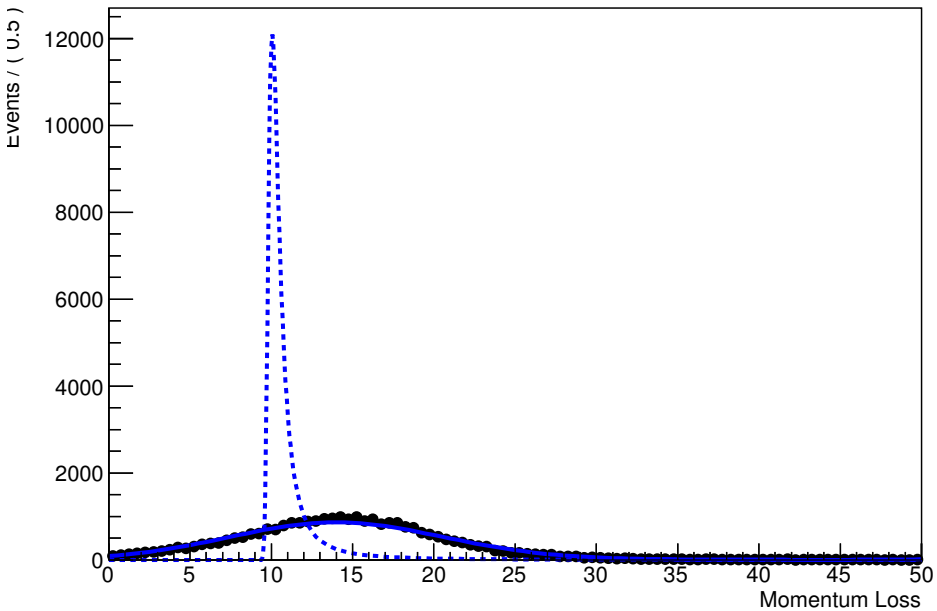
140 MeV



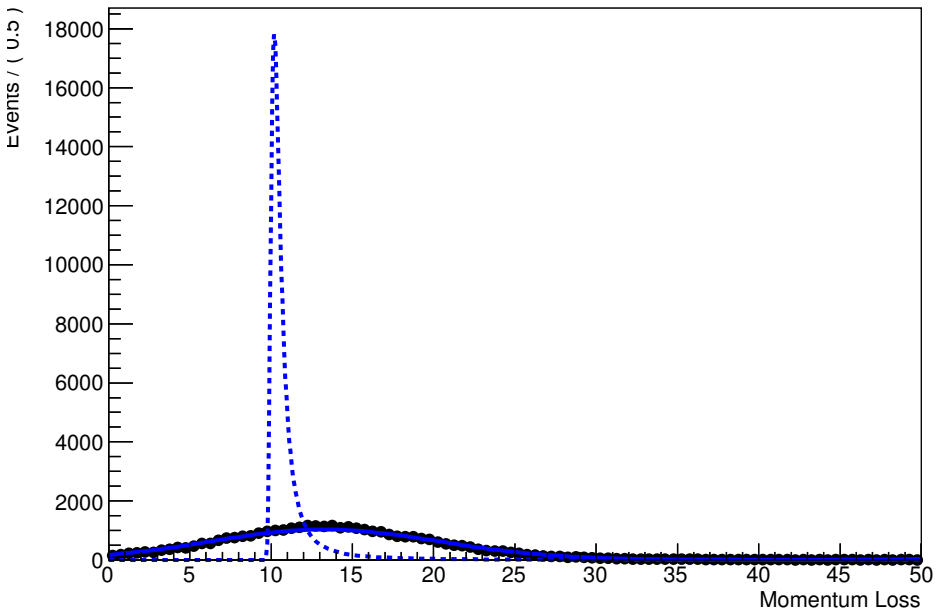
170 MeV



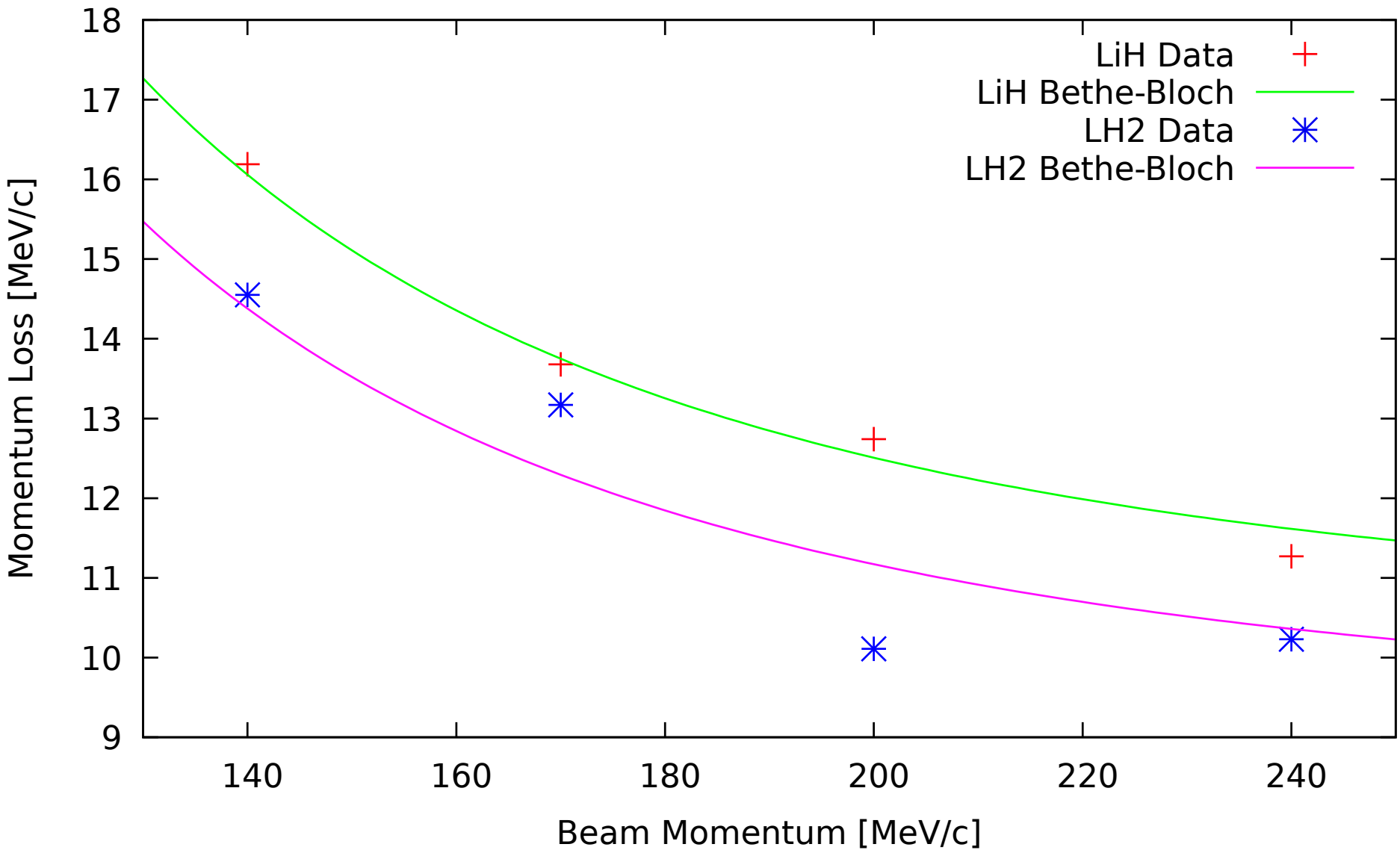
200 MeV



240 MeV



Comparison to Theory



Current Work

- Running analysis on more MC samples for better comparisons
- Systematic uncertainties
  - Most points are about ± 0.2 MeV from theory
  - Width of some landau distributions are a bit small
- Trying to understand LH2 170 and 200 points: ~ 1 MeV from expected
- Writing up for the system performance paper