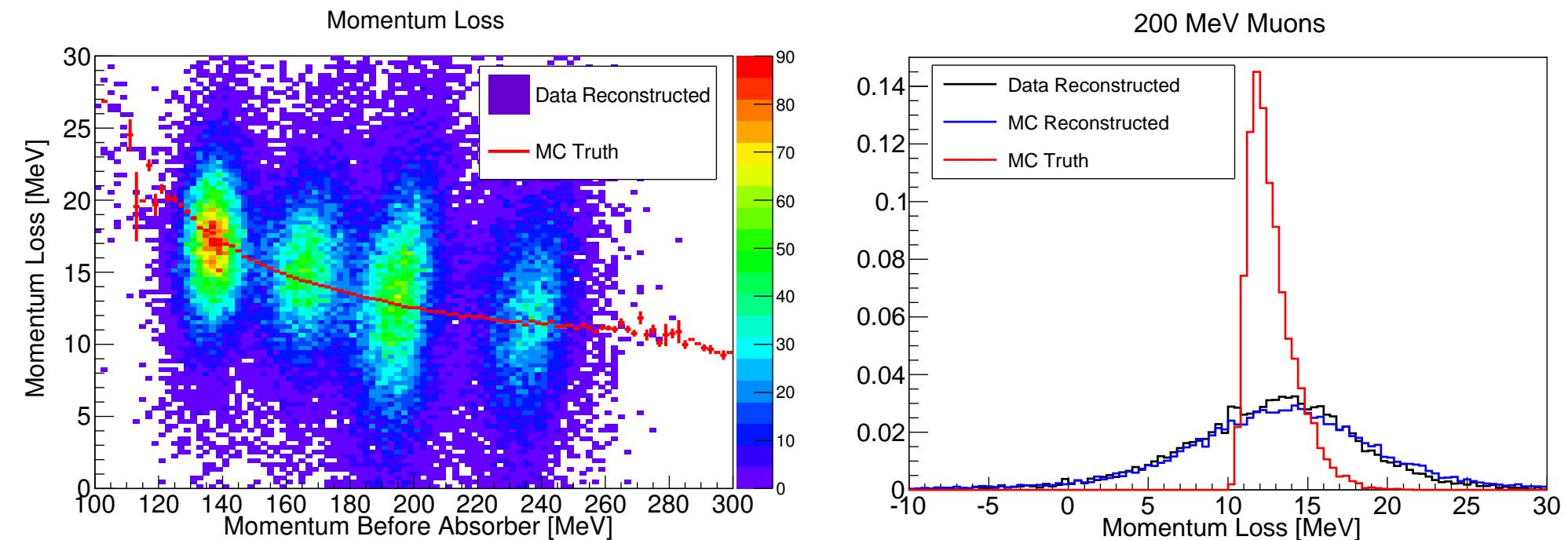


Energy Loss Analysis

Scott Wilbur

University of Sheffield

Momentum Loss Measurement

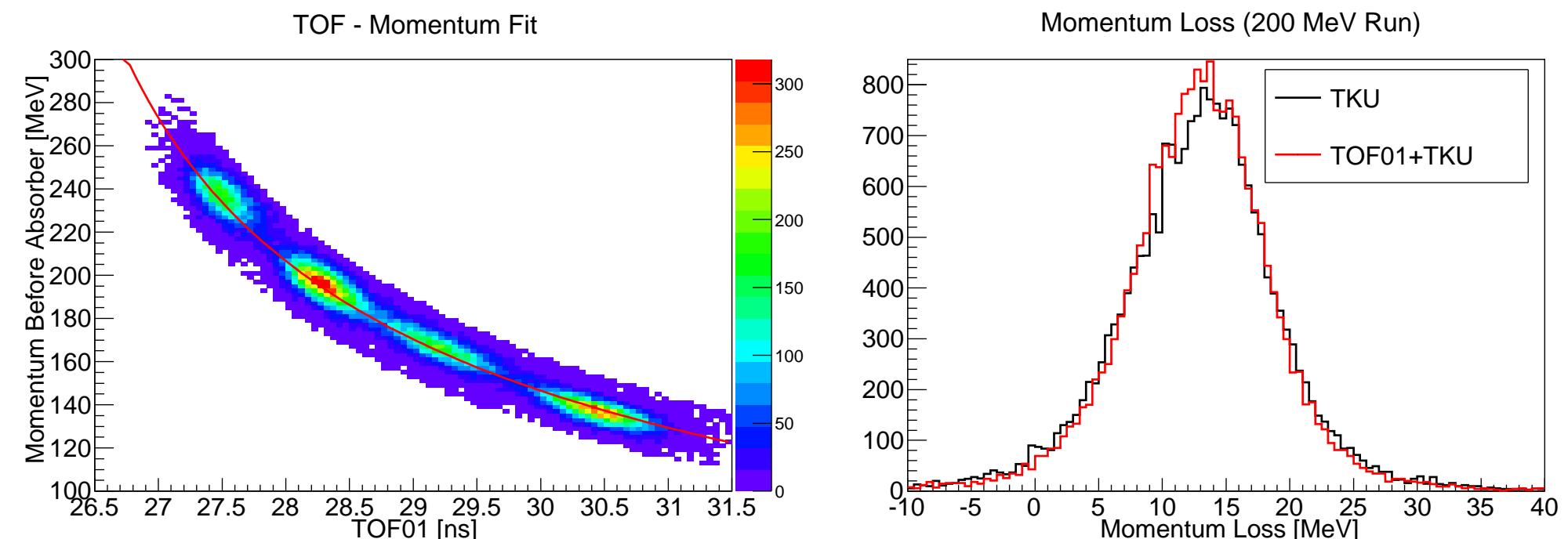


- With two working trackers, simple measurement is easy
- 200 MeV MC: (13.3 ± 5.9) MeV
200 MeV Data: (12.8 ± 5.3) MeV
- Can improve upon this simple measurement

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

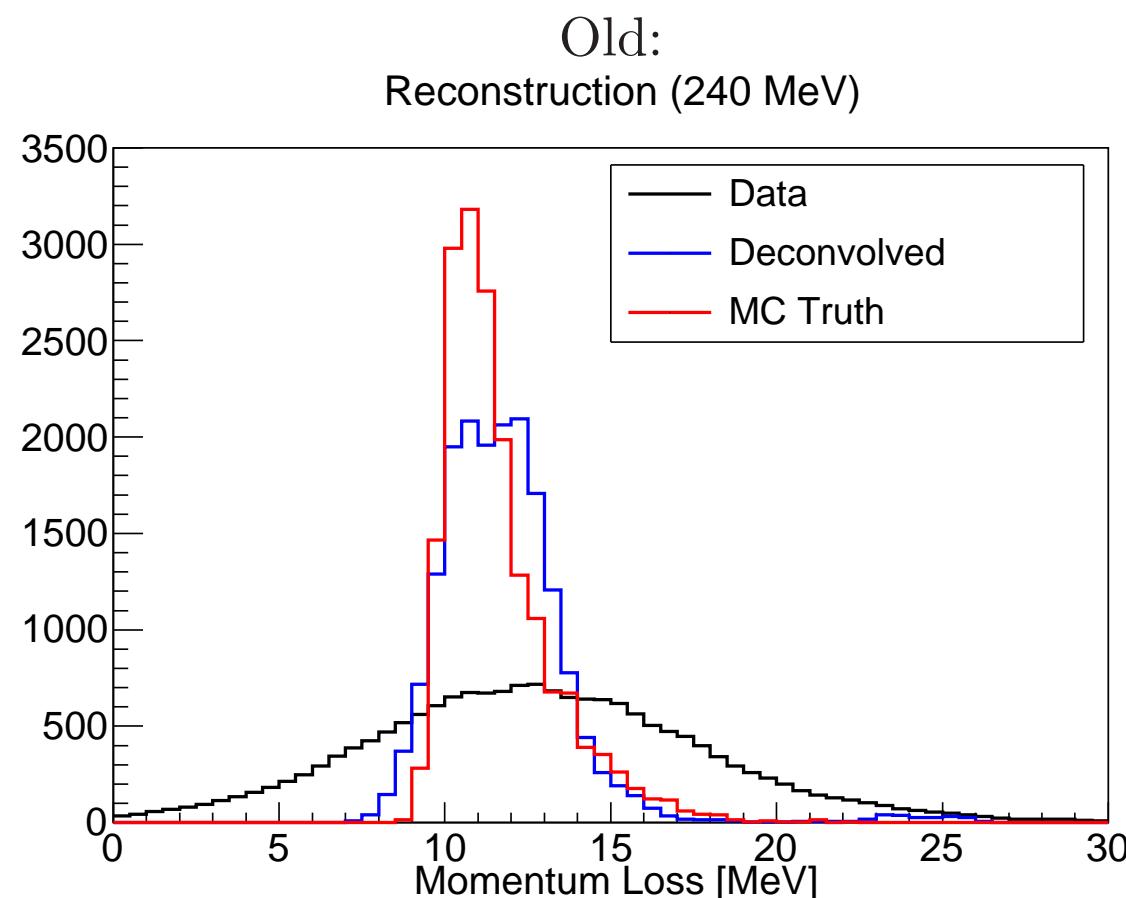
Adding TOF



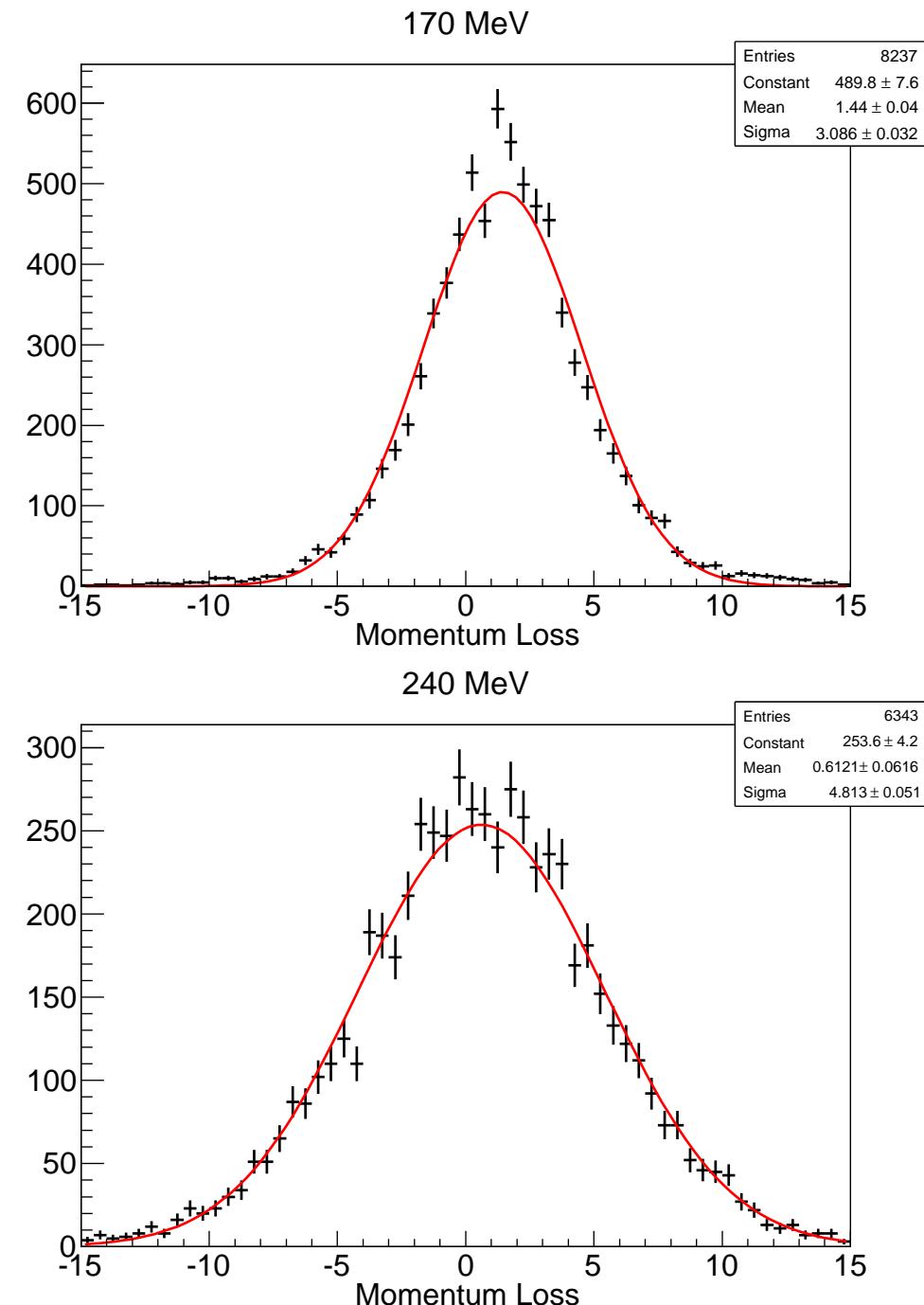
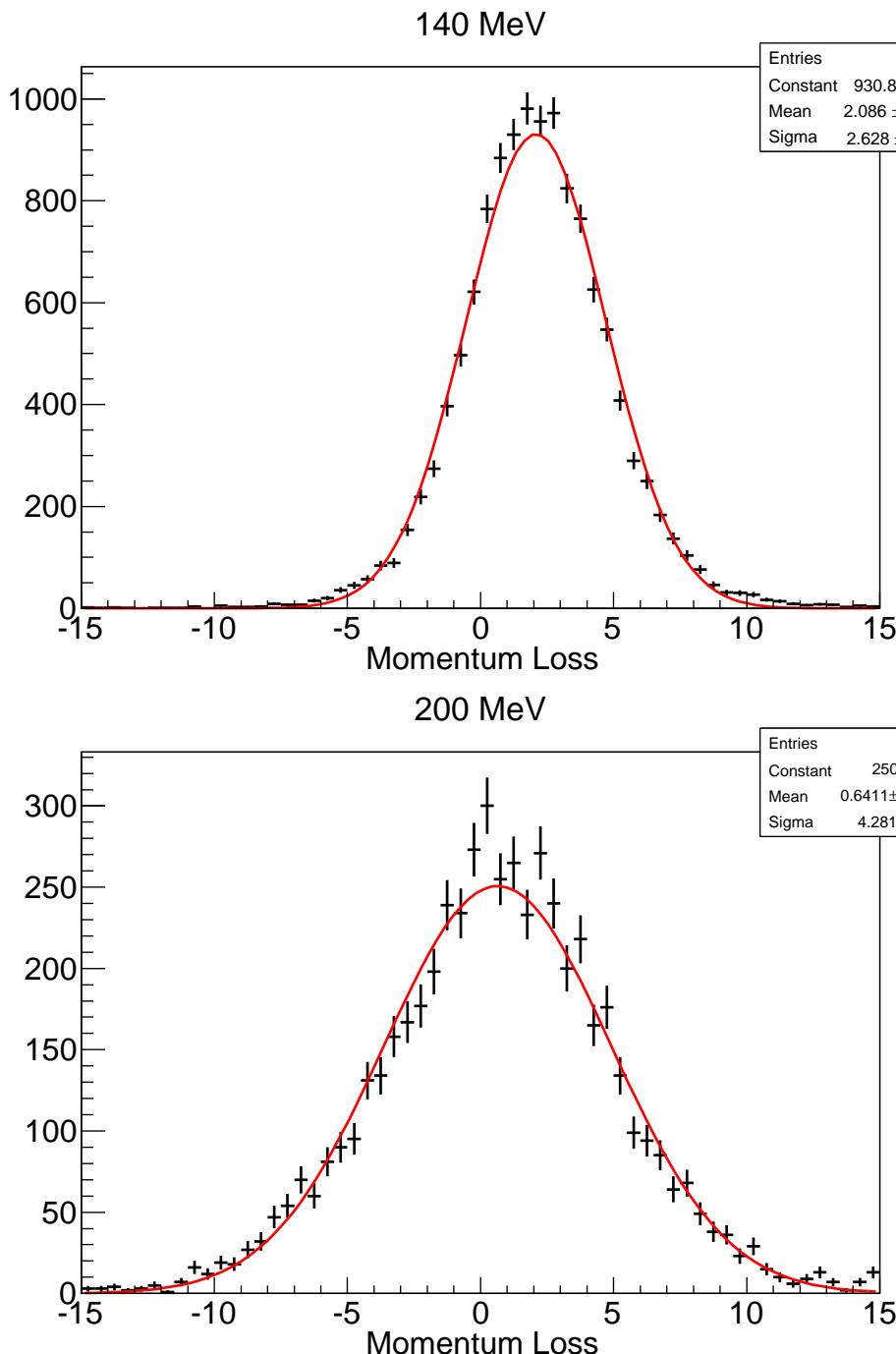
- TOF01 gives a momentum measurement with similar precision to the tracker
- Combining TOF and tracker measurements improves the upstream resolution

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

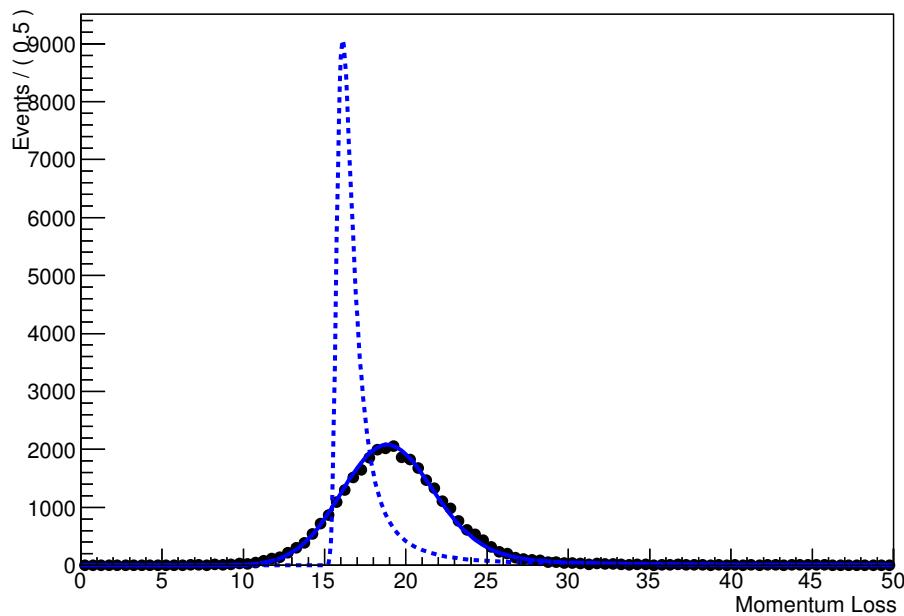


Empty Absorber Fits

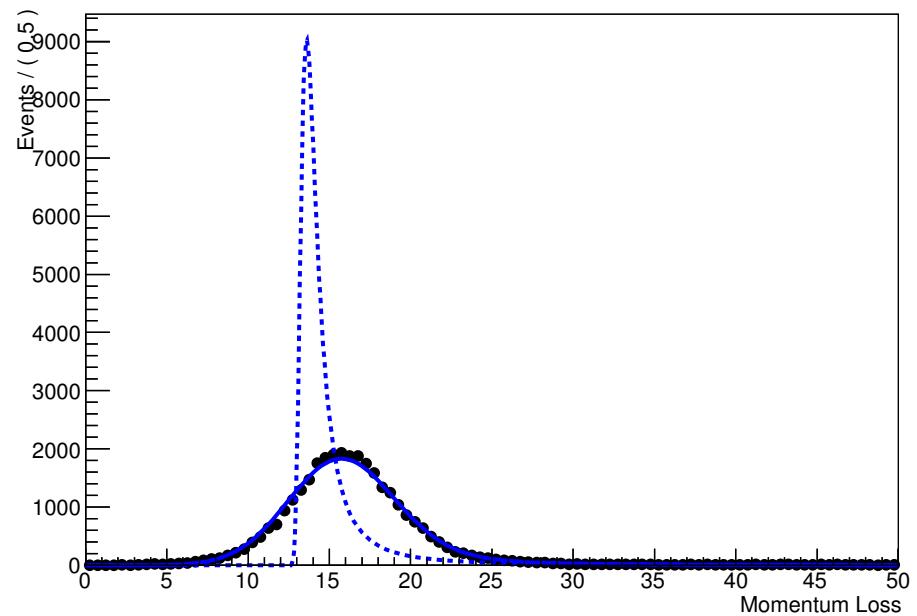


Convolved Energy Loss Fits

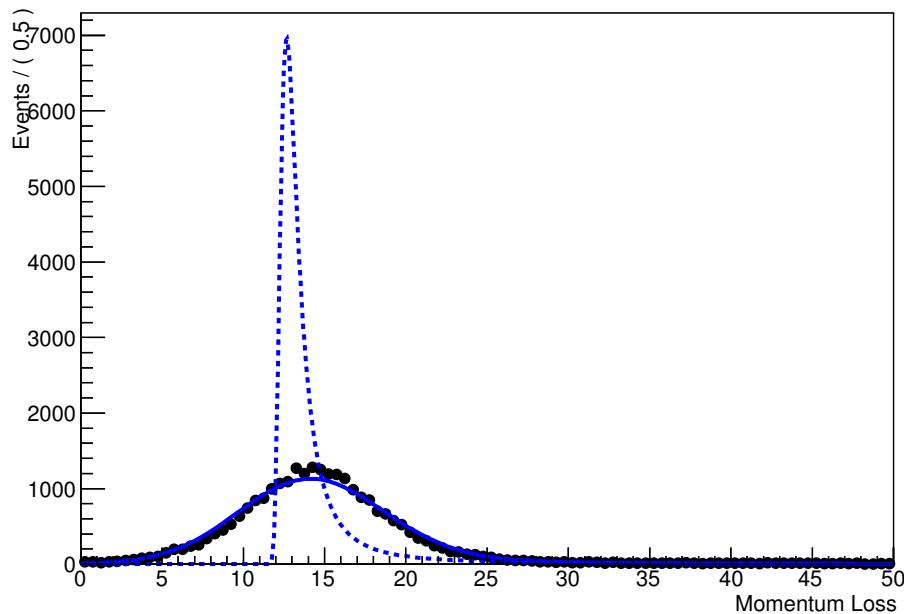
140 MeV



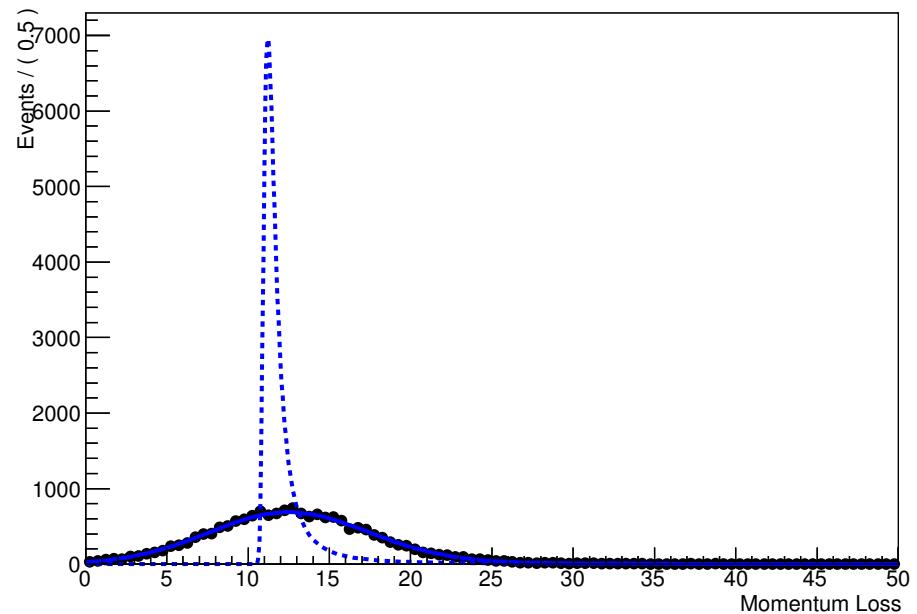
170 MeV



200 MeV



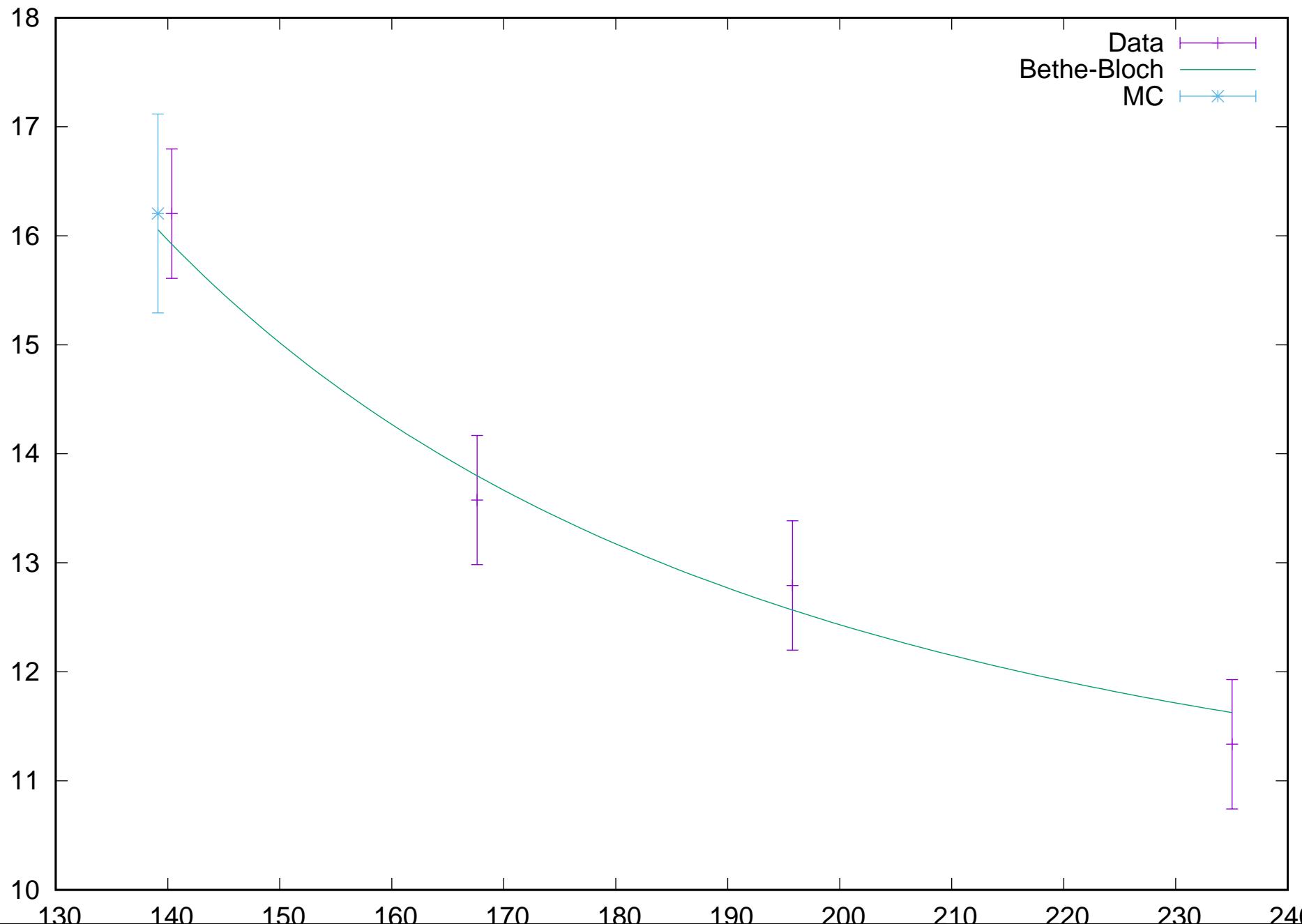
240 MeV



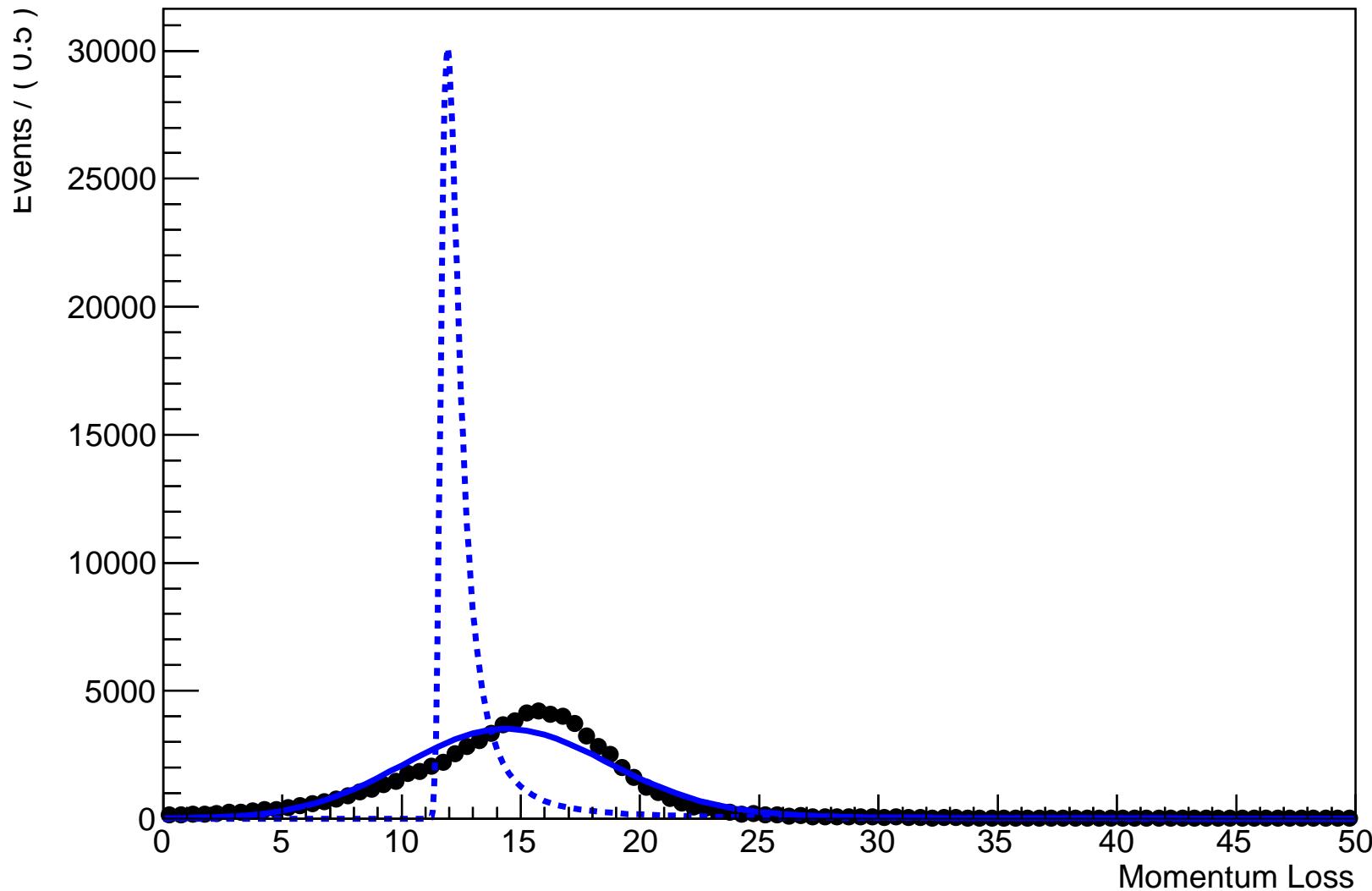
Systematic Uncertainties

- Empty and Full absorber runs have different momentum correction between TOF and tracker
- Using correction from Empty run for measurement in Full run gives different energy loss measurement
- Convolution fit method assumes that the two runs are identical
- Use measurement at different momentum correction as systematic uncertainty (0.59 MeV)
- gives a much smaller uncertainty in LH2 runs – possibly related to the fact that the fits aren't great

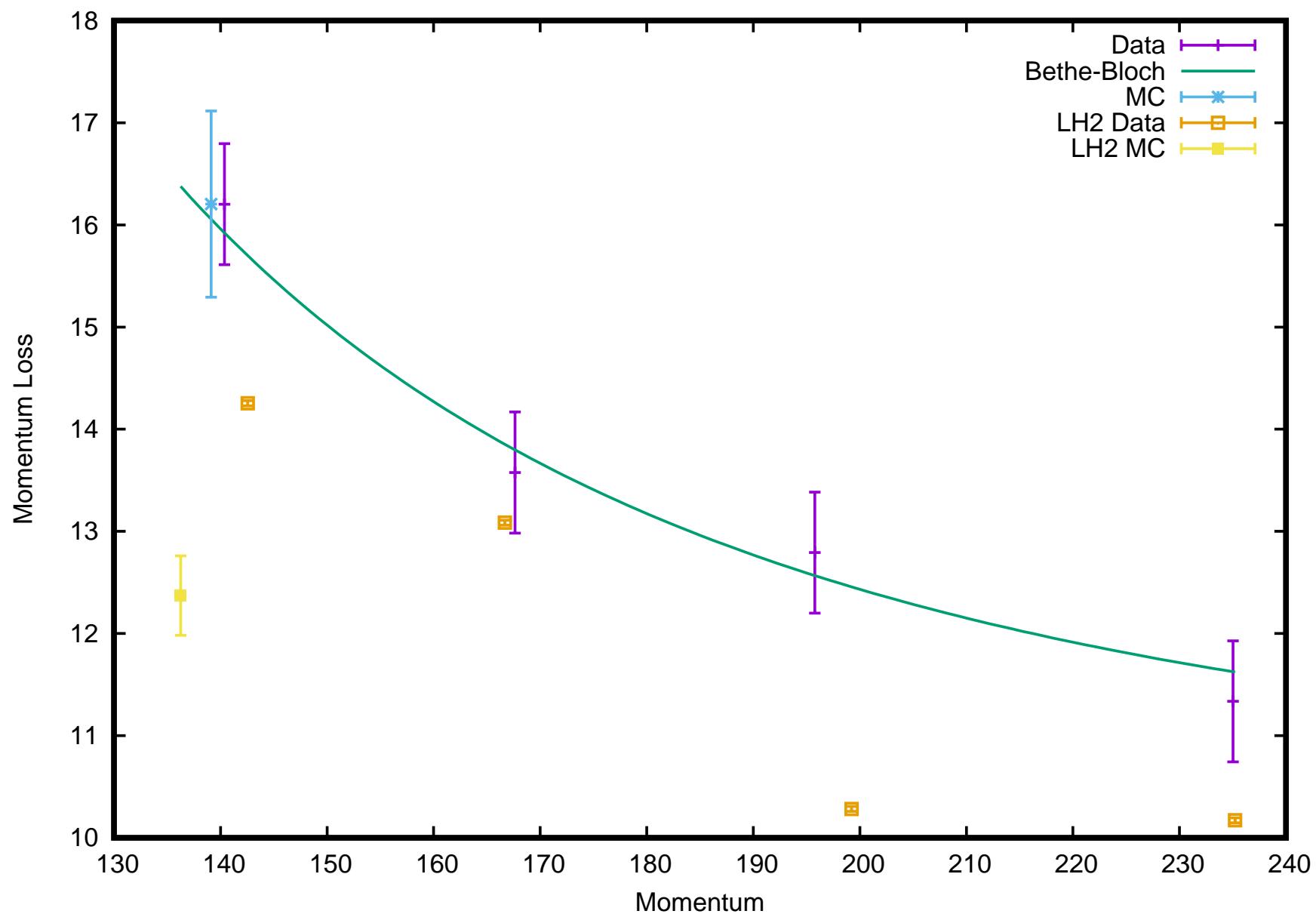
Comparison to Theory



landau (x) gauss convolution



LH2 Issues



Current Work

- Extrapolate LH2 tracks to measure distance in absorber
 - Hopefully should improve LH2 measurements
- Writing up for the system performance paper