Proton Therapy Group Meeting 17th January 2018

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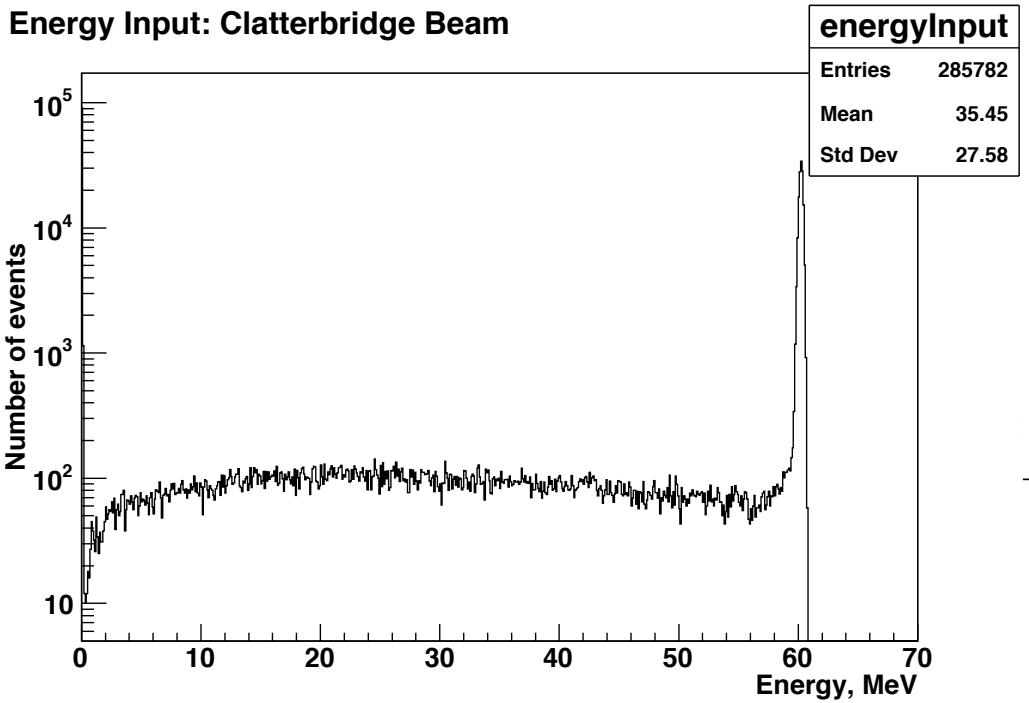
Simulations

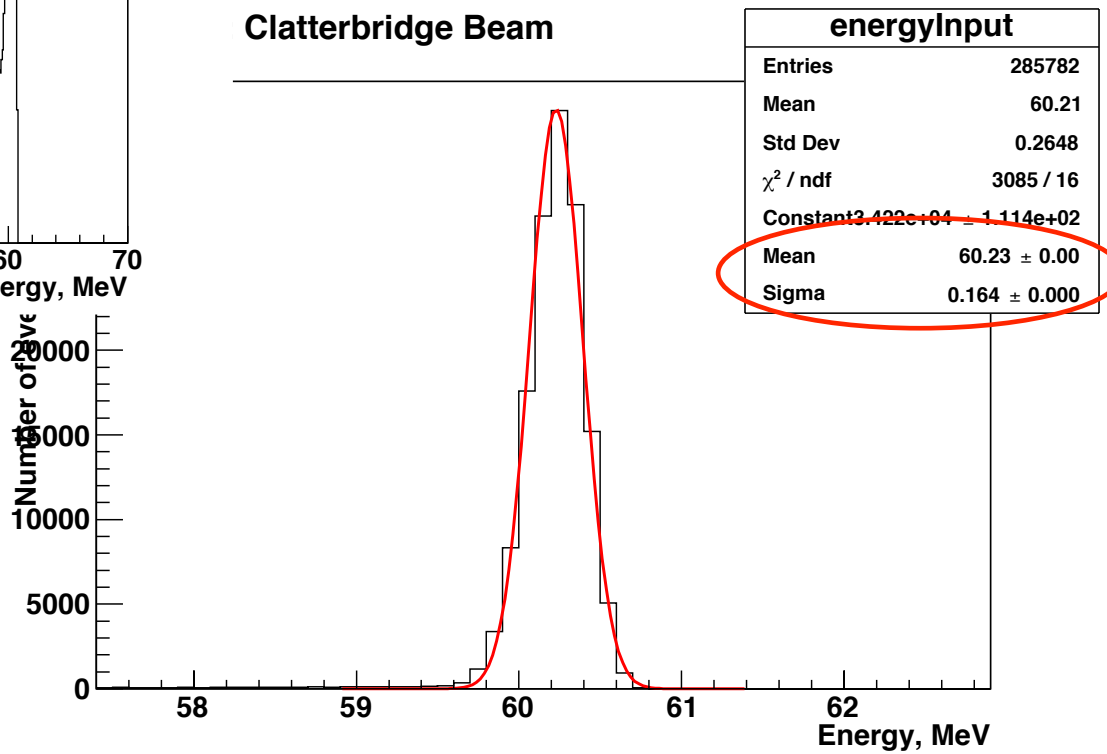
- Investigating the difference between MC truth and energy resolution returned by the fit
- Energy resolution input changed in steps of 0.5% from 7.0% to 10.5% (at FWHM)
- Input file into simulations:

output_z1767_1mm_radius_0mm_offset_1e9_primaries.txt

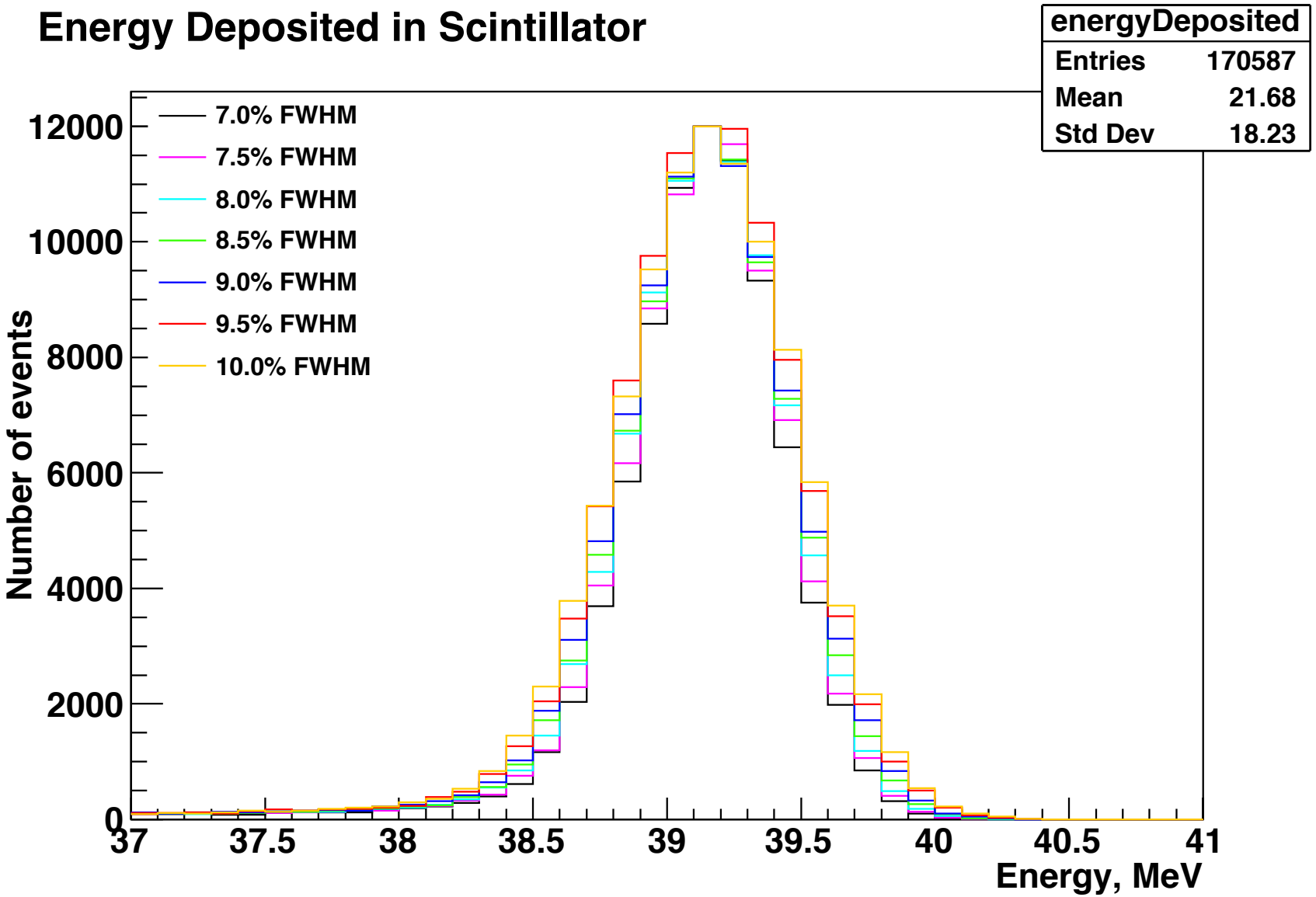
(with end cap collimator)

Simulations: Clatterbridge Beam

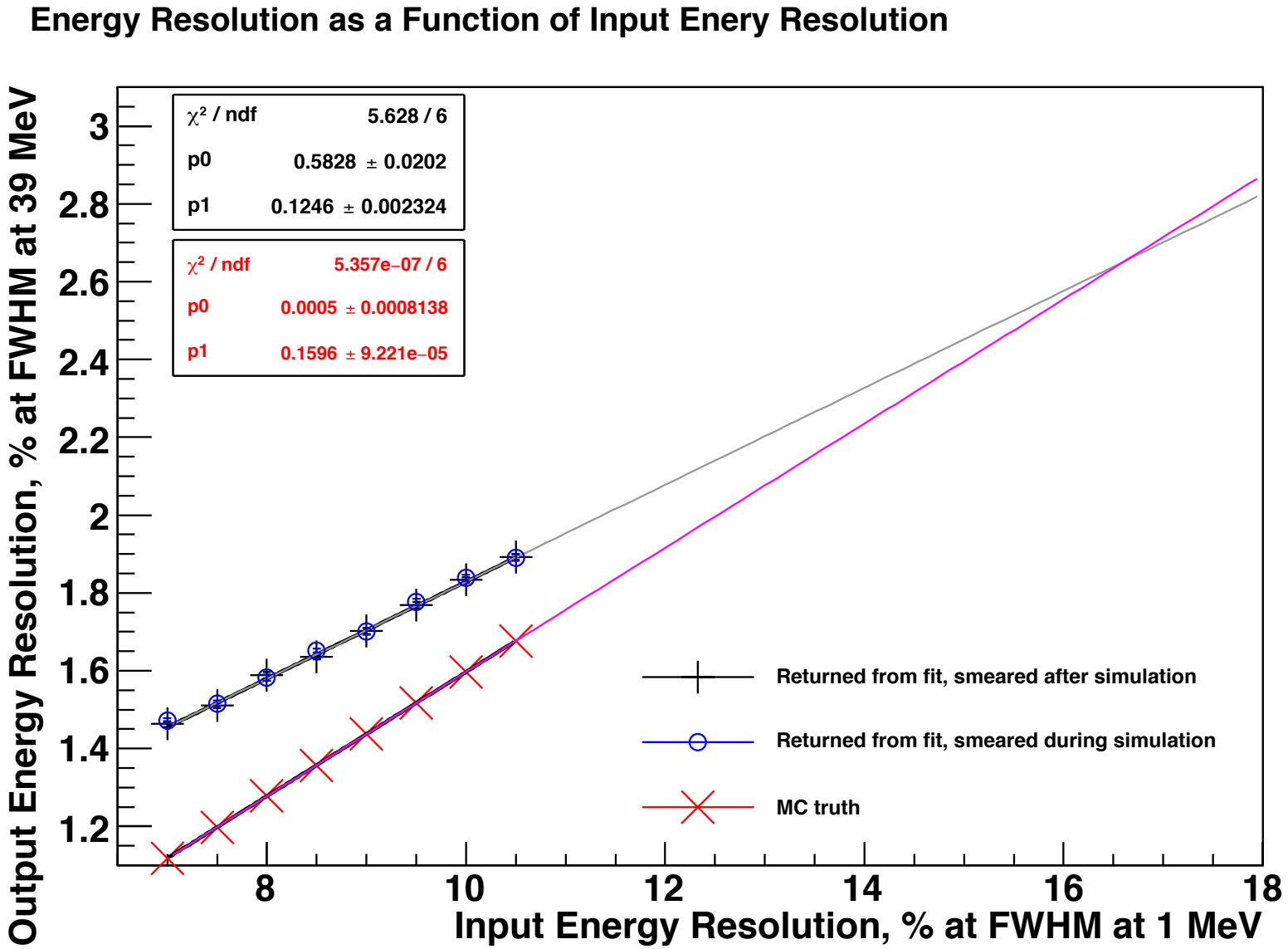




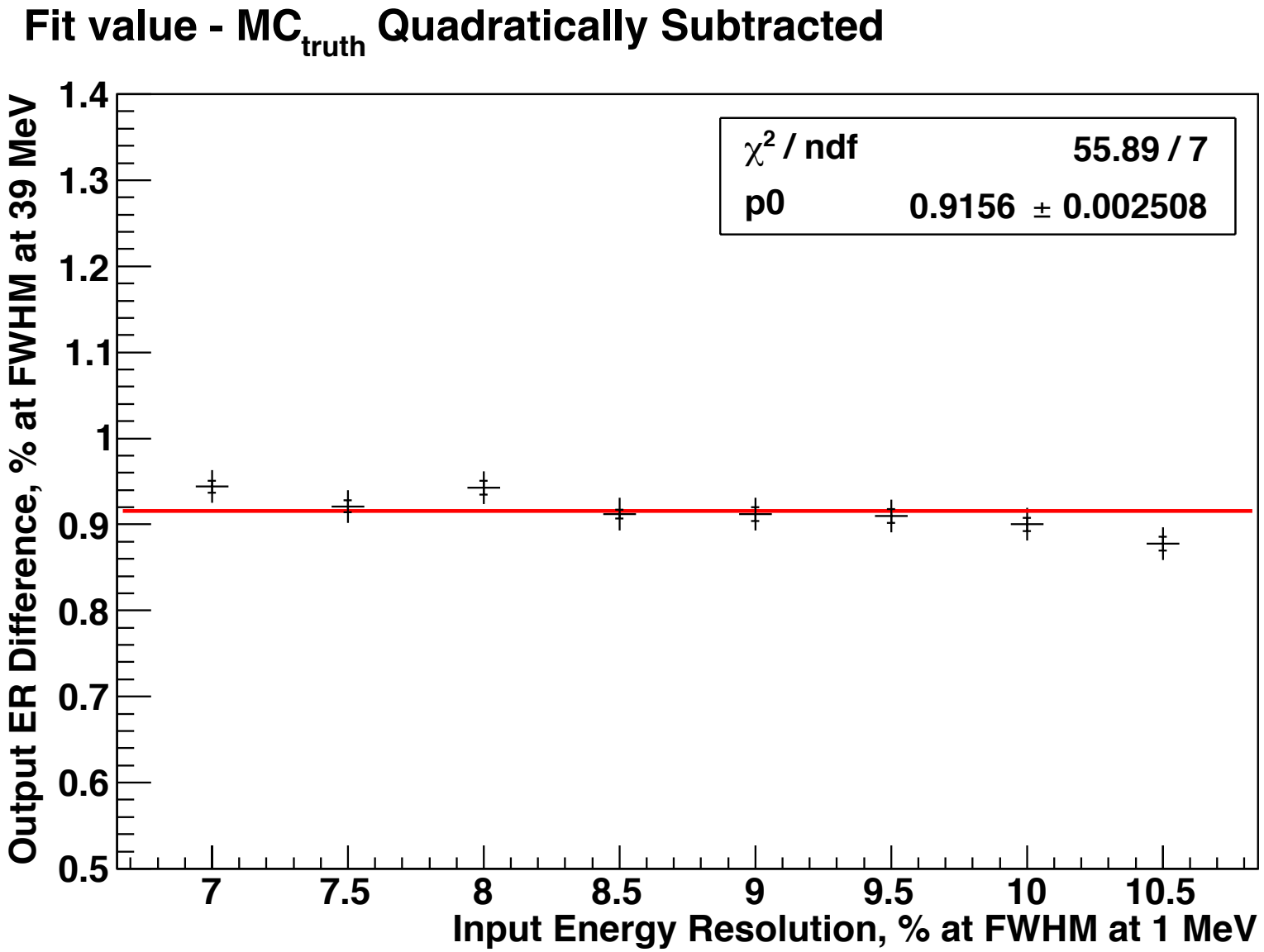
Simulations: Clatterbridge Beam



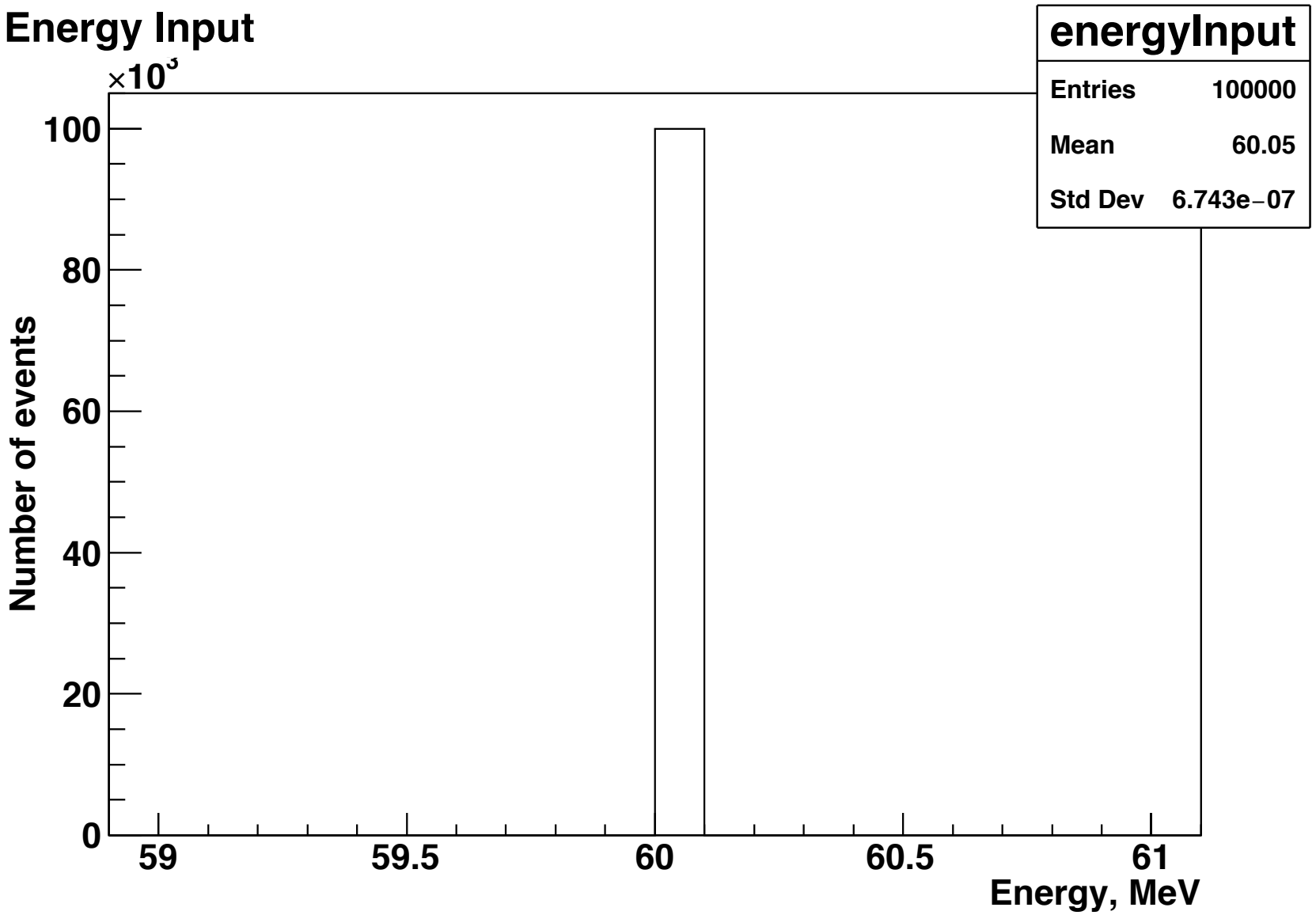
Simulations: Clatterbridge Beam



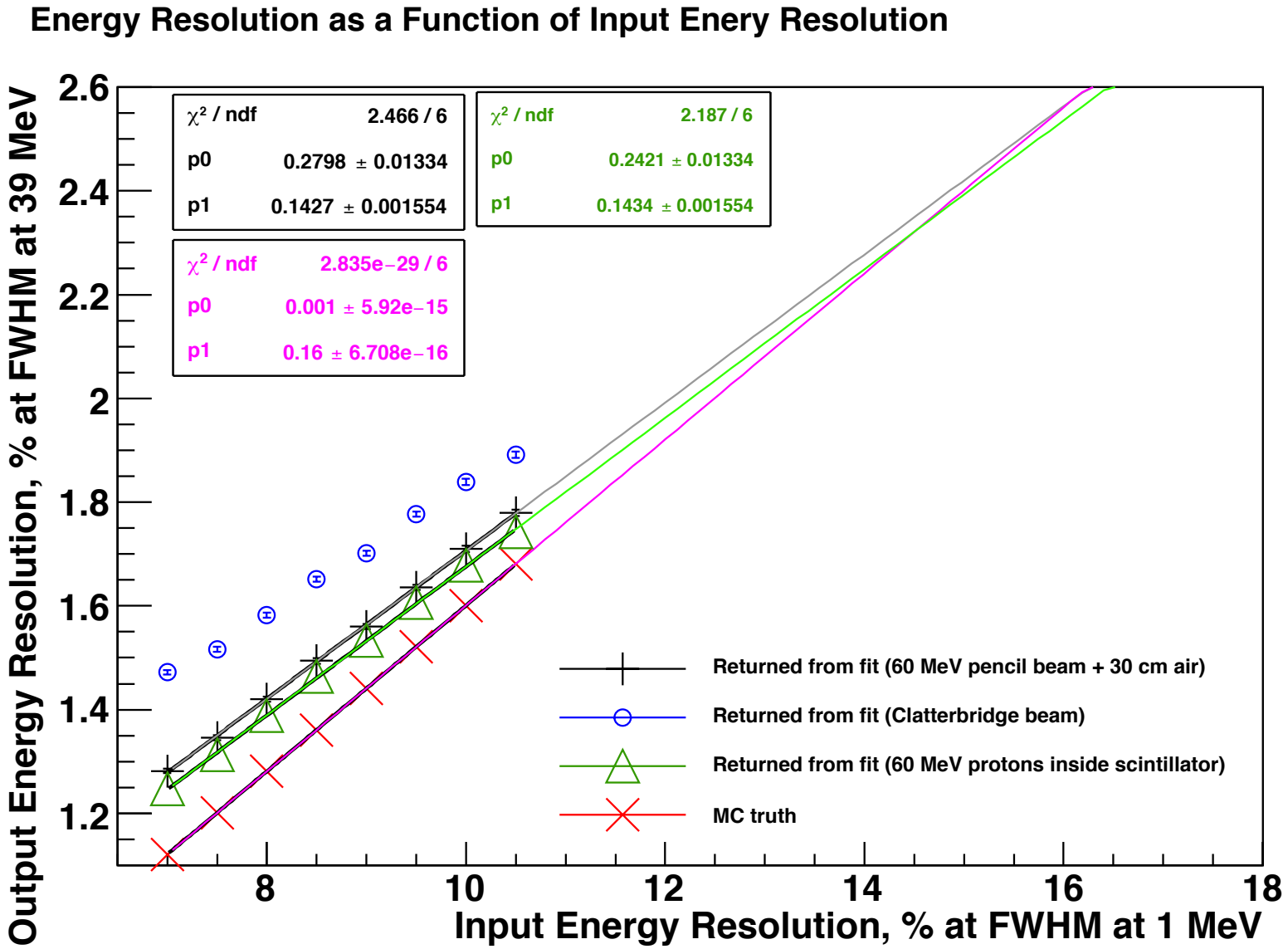
Simulations: Clatterbridge Beam



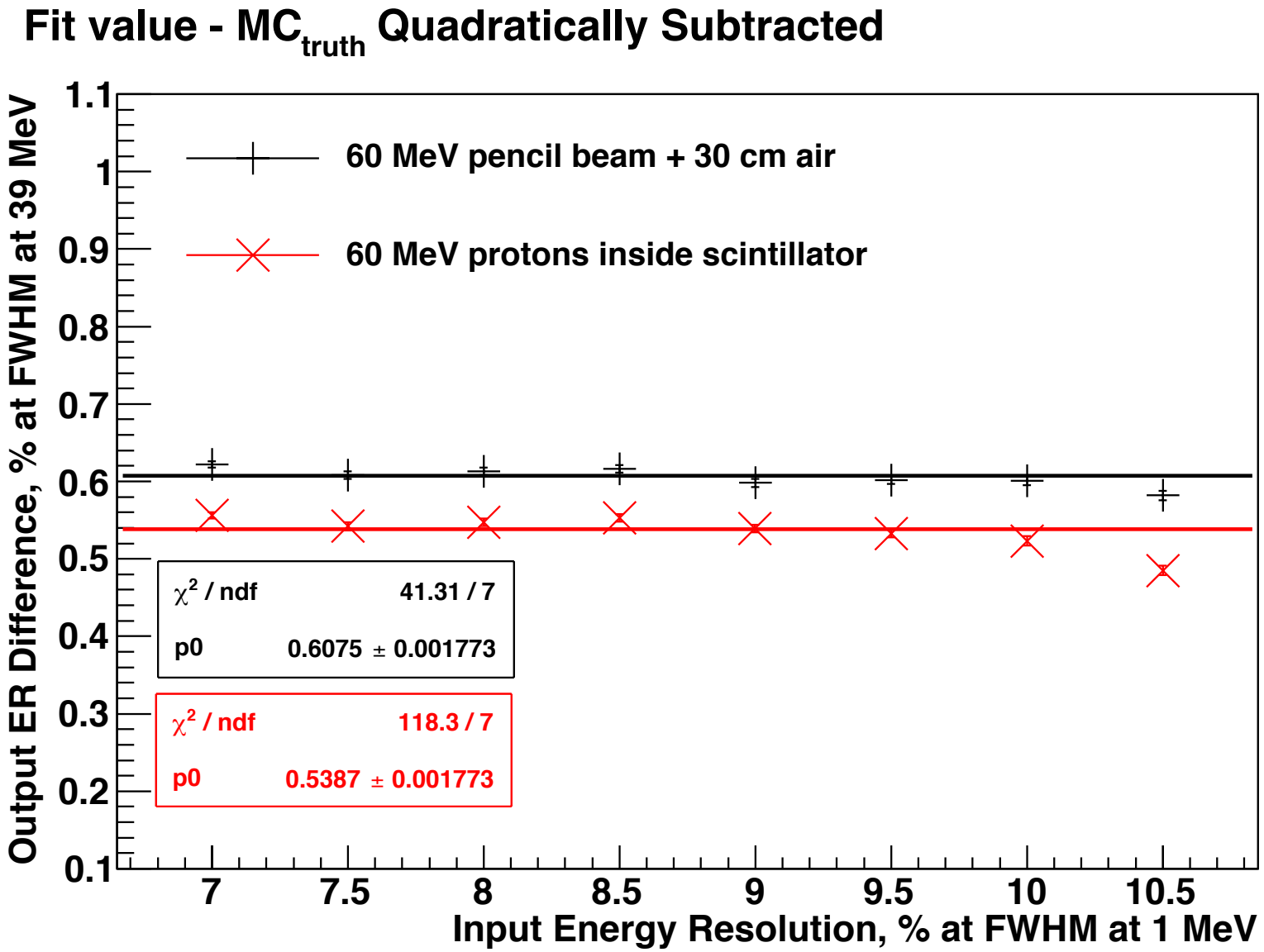
Simulations: 60 MeV Pencil Beam



Simulations: 60 MeV Pencil Beam



Simulations: 60 MeV Pencil Beam + 30 cm Air



Simulations: Conclusions

- $(MC_{truth} - \text{fit value})_{\text{Clatterbridge beam}}$:
  - 0.9156 (FWHM)
  - 0.39 (σ)

- $(MC_{truth} - \text{fit value})_{\text{Pencil beam (inside scintillator)}}$:
  - 0.5387 (FWHM)
  - 0.23 (σ)

- Difference between the two, subtracted quadratically: 0.32 σ
- Compared to 0.164 σ from Gaussian fit to Clatterbridge input beam

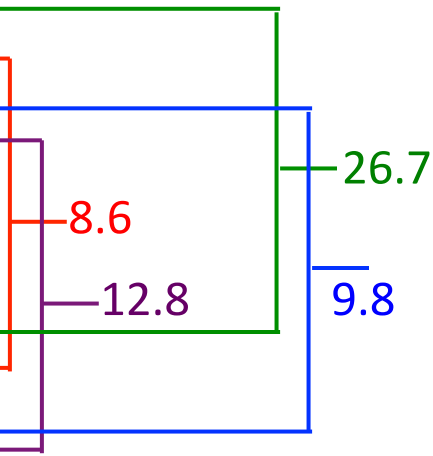
Paint Tests on Scintillator Sheets

- Derek suggested to use black chalkboard paint (water based)
- Old scintillator sample sheet partially painted on 08/01/2018:
  - We will observe whether there are any effects on the scintillator with time
  - So far so good!

Paint Tests on Scintillator Sheets

- 3mm enhanced composition sheet fully painted on all sides except the "read out" side and tested:

Wrapping	LED Voltage	μ	σ (pedestal subtracted)	ΔE/E (FWHM)	Npe
2 x Mylar	2.5 V	18461	53.7	0.68 ± 0.002	118336
2 x Mylar	2.21 V	8807	74.0	1.97 ± 0.002	14177
Naked	2.5 V	16196	53.0	0.77 ± 0.002	93668
Naked	2.21 V	6578	62.0	2.22 ± 0.002	11240
Black paint	2.5 V	2153	32.3	3.53 ± 0.003	4440
Black paint	2.21 V	688	18.1	6.18 ± 0.004	1444
Black paint	3.51 V	8891	66.1	1.75 ± 0.002	18090



- More tests to be carried out:
  - How do we get an even and thin finish?
  - Air gun, spray paint etc.