Straggling in COSY

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Ranges

- Thin absorbers (or absorbers with <20 interactions per step) = Gaussian treatment
- Thick absorbers are Landau up to pz = 1 GeV
- Initial momentum range: [100, 500] MeV
- Momentum loss: [5, 100] MeV
  - Absorber length range: [15, 225] cm

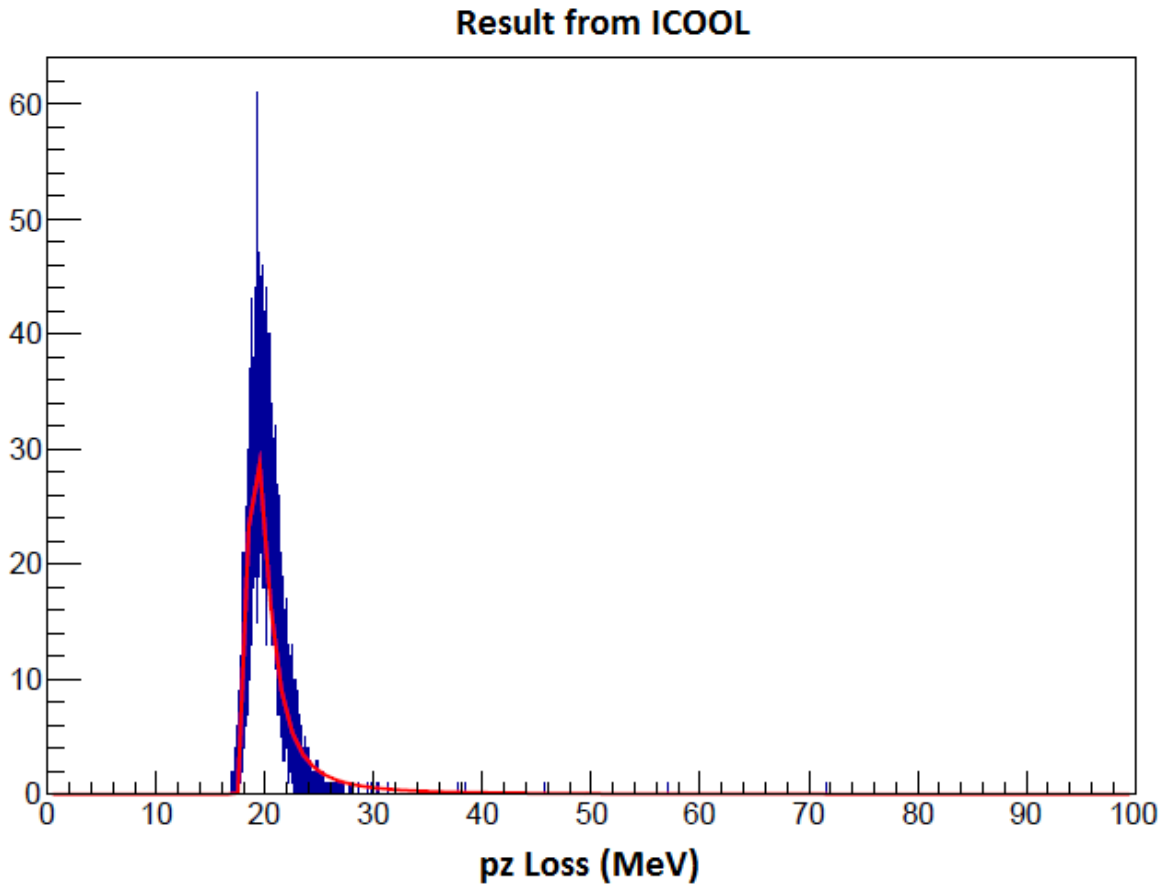
Root Curve Fitting

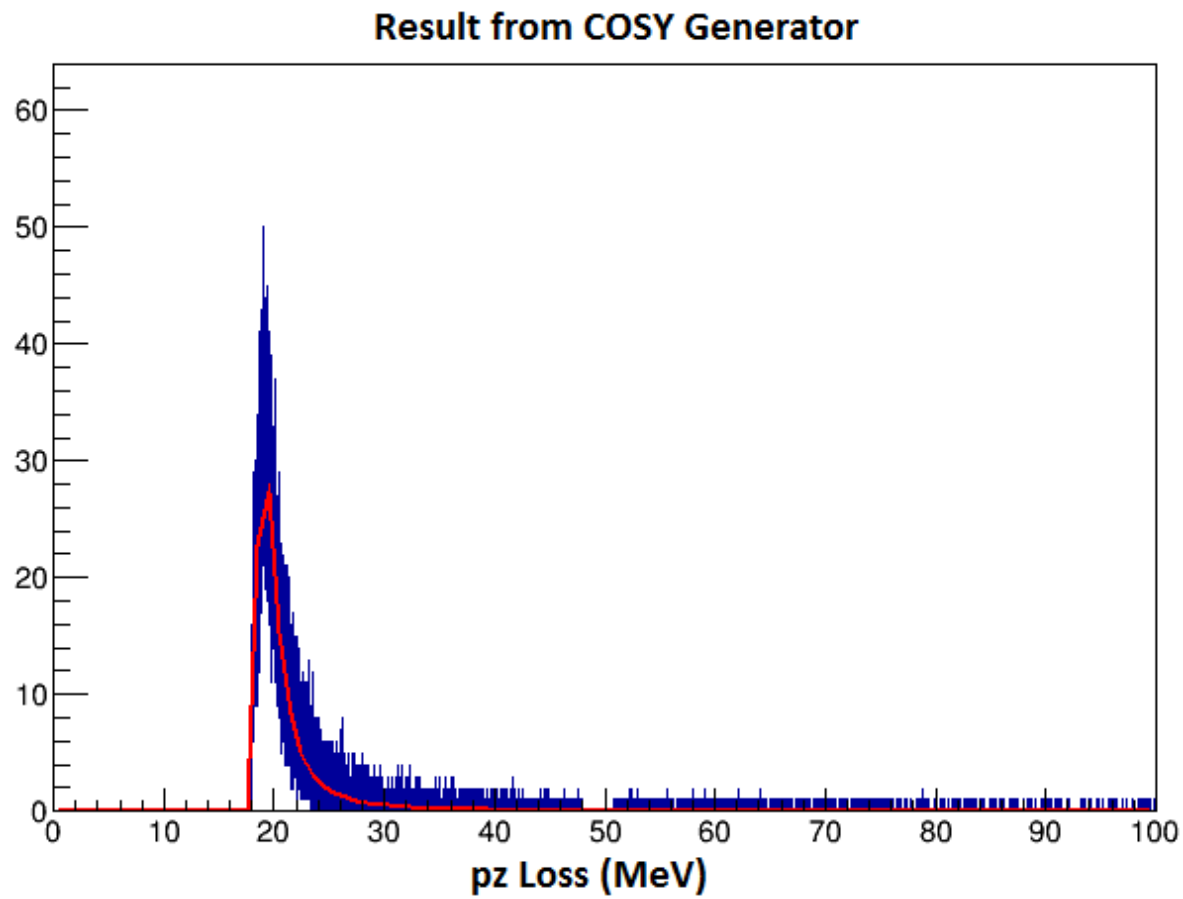
	COSY Generator (Input)	ROOT Fit (Output)
μ	0.5	0.499965
σ	0.5	0.510354
μ	0	-0.00939
σ	1	1.00188
μ	5	4.99965
σ	5	5.10354

Landau in ROOT (1/3)

- ICOOL returned 50,000 particles with mean pz loss of 20 MeV (pencil beam)
- ROOT found parameters to be (μ,σ) = (19.1832,0.563532)
- Generate distribution in COSY with same parameters
- Fit this back into ROOT, ROOT says (μ,σ) = (19.1576,0.54885)
- Conclusion: optimistic about COSY generator

Landau in ROOT (2/3)





Landau in ROOT (3/3)

- Best fit (red line) looks the same for either plot
- From the plots, there must be further constraints on particle energy loss (e.g. sigma cutoff to shorten tail).
- ICOOL distribution is discrete, whereas COSY generator is continuous