

# Proton-argon Inelastic Cross-section Analysis Update

- ▶ Study of  $KE_{ff}$  using  $KE(\text{fit})$

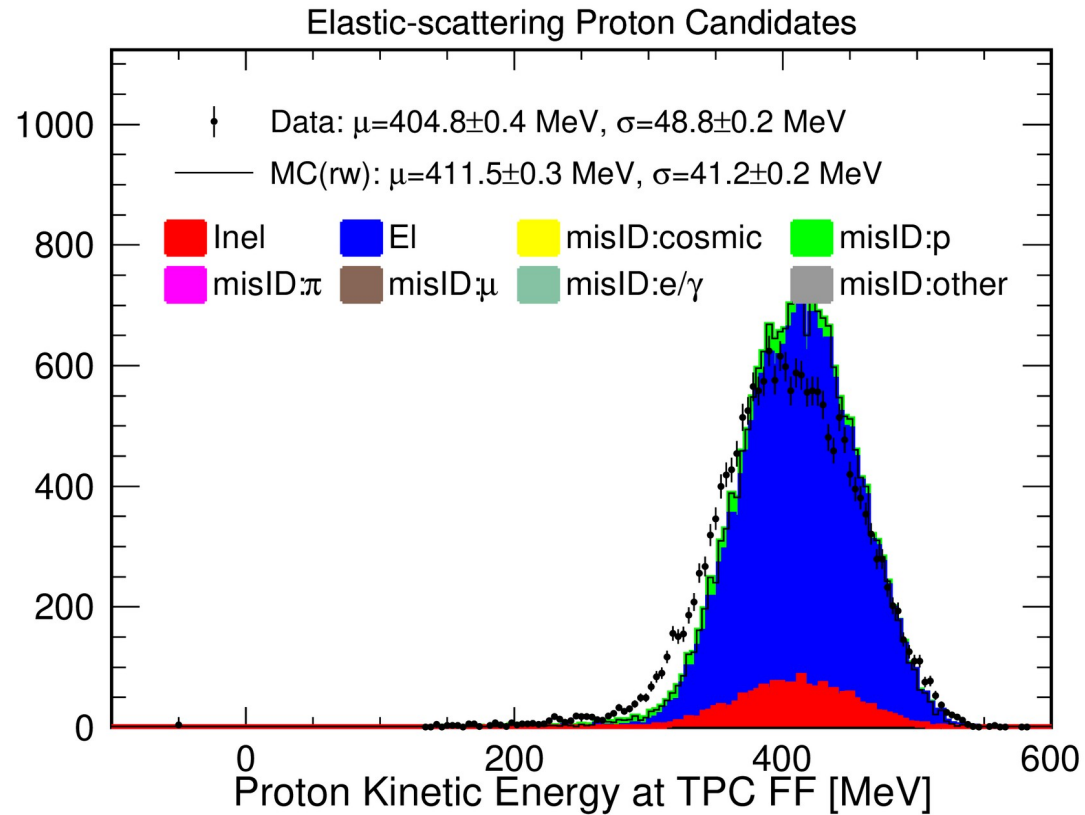
Heng-Ye Liao

Hadron-argon XS Analysis Meeting

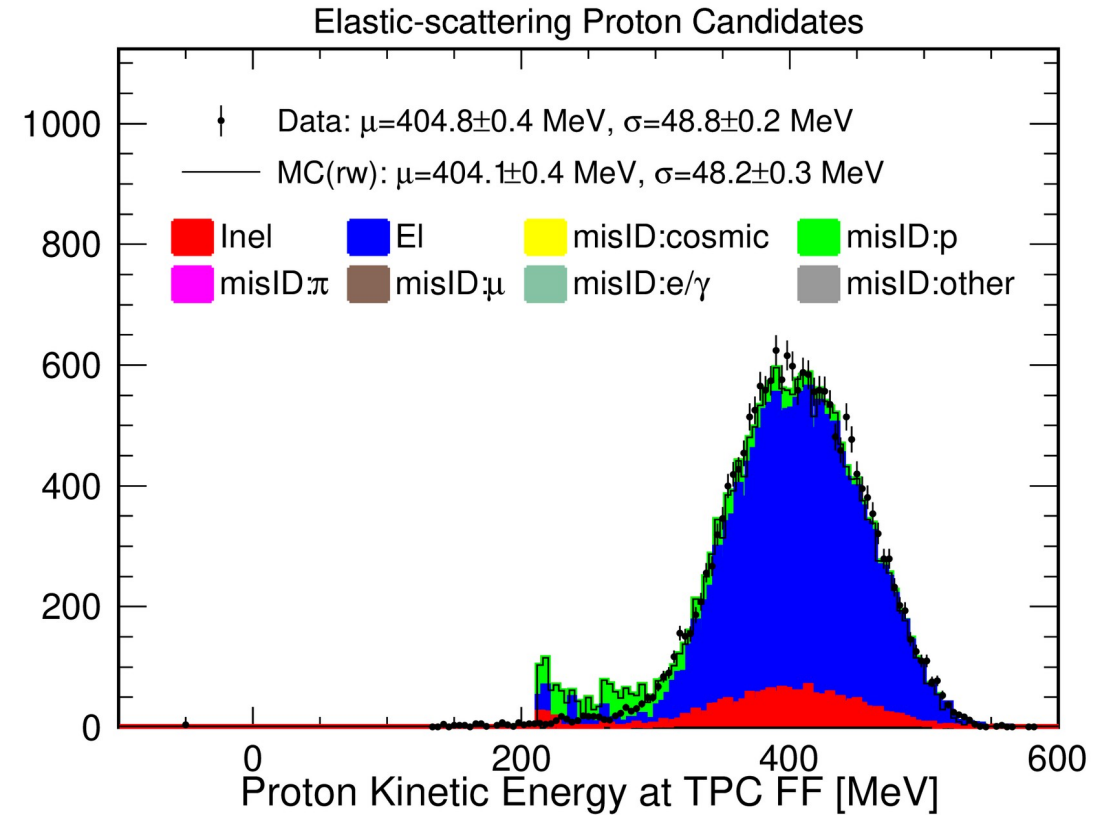
Sep 29, 2022

# KE<sub>ff</sub>(Fit): Elastic-scattering Channel

No BMRW

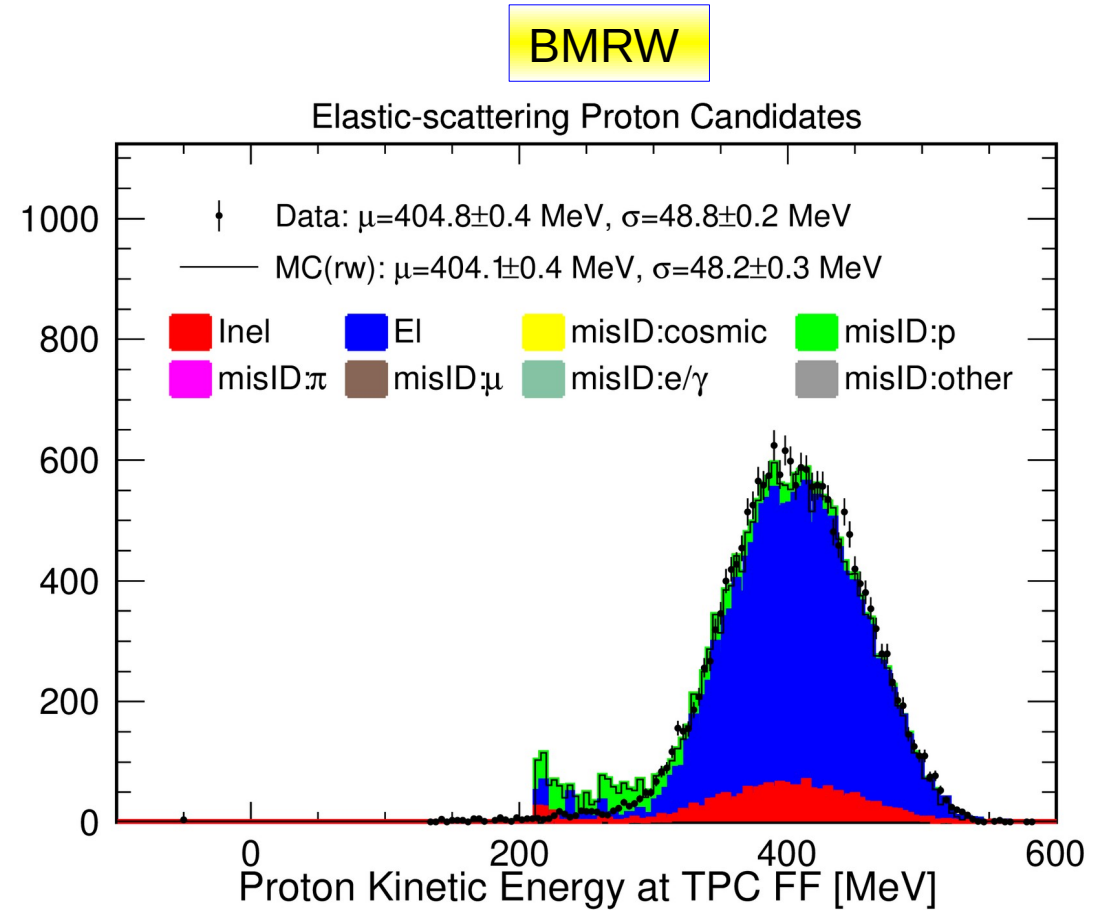
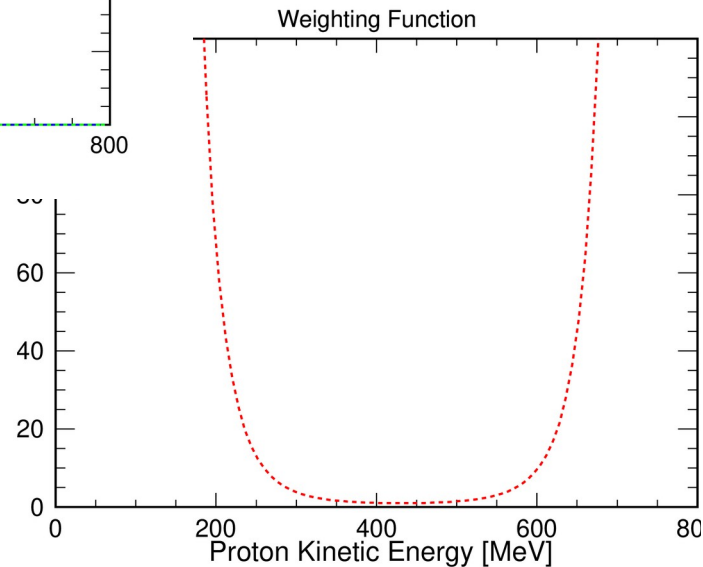
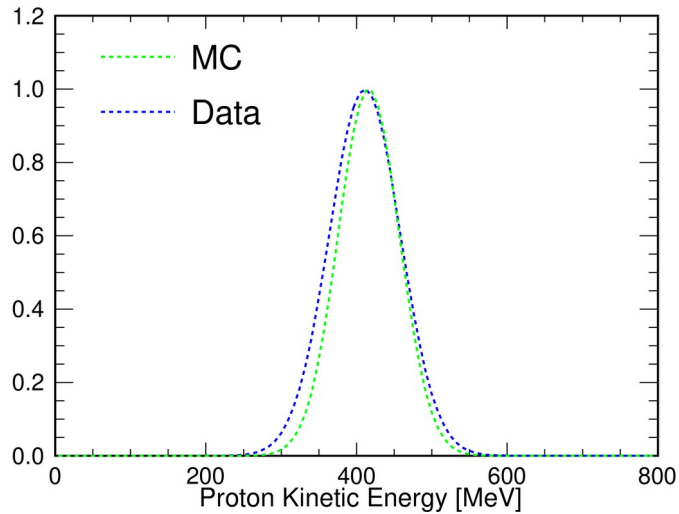


BMRW



- ▶ Misidentified secondary protons have lower KE<sub>ff</sub>
- ▶ Events on tail get amplified after BMRW

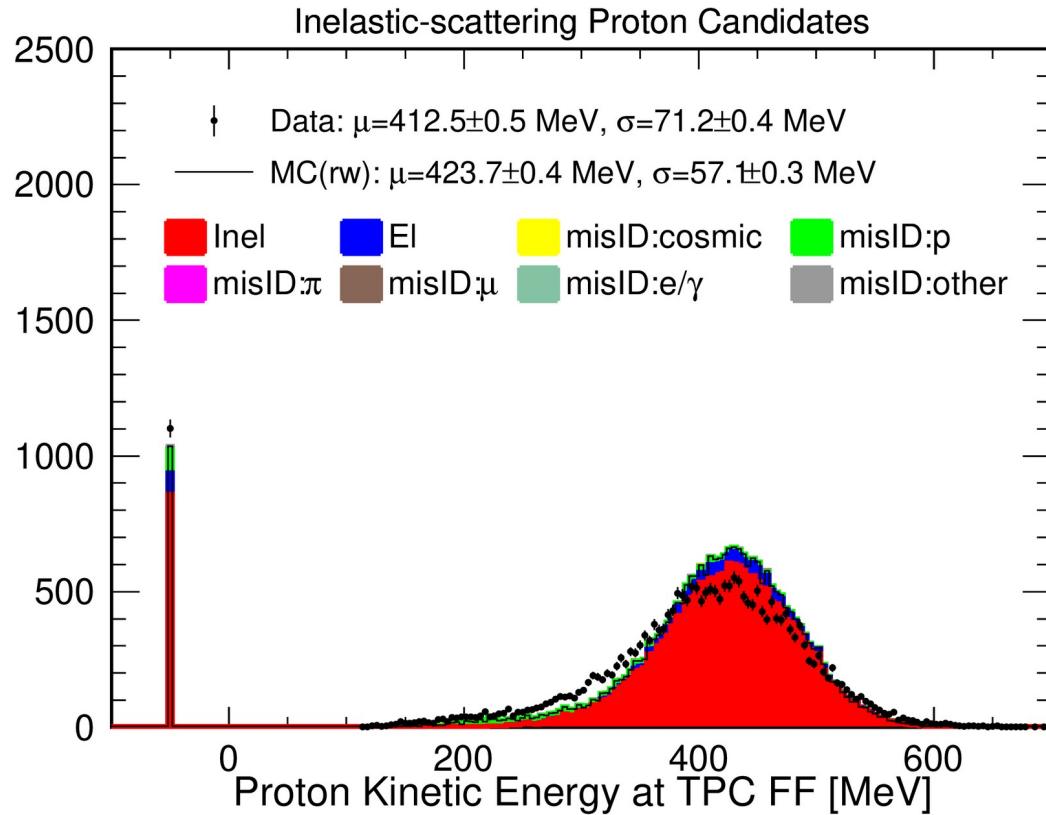
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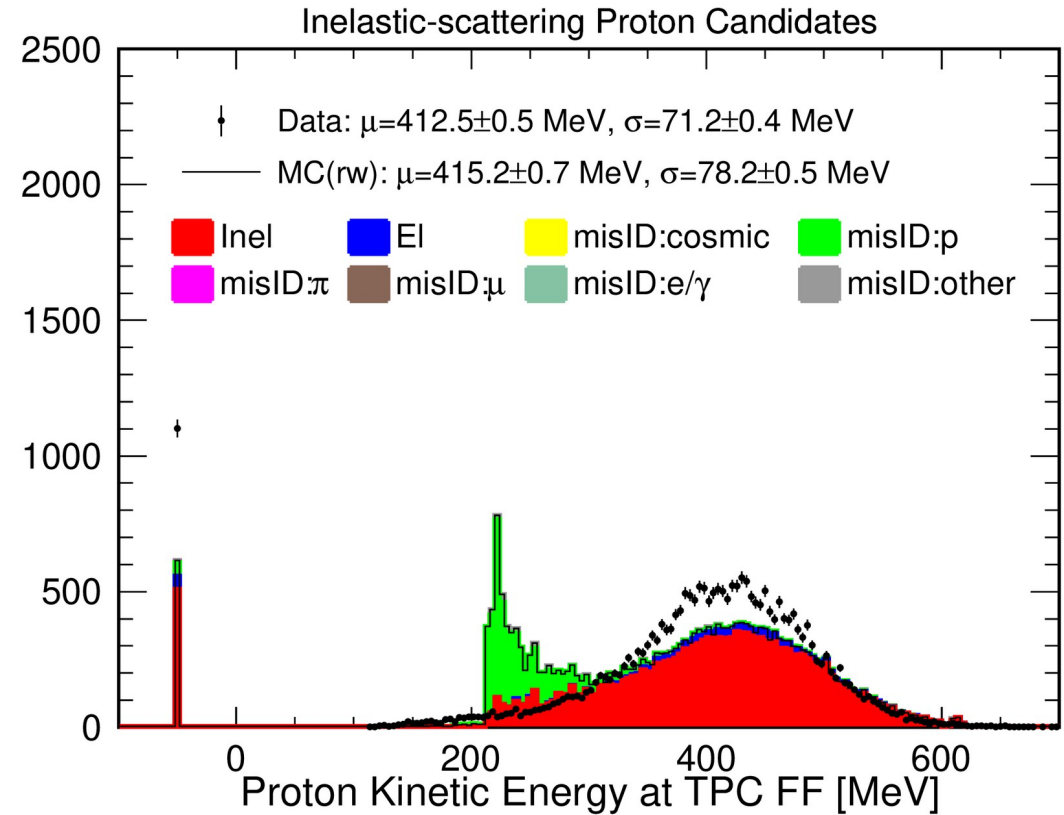
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# KE<sub>ff</sub>(Fit): Inelastic-scattering Channel

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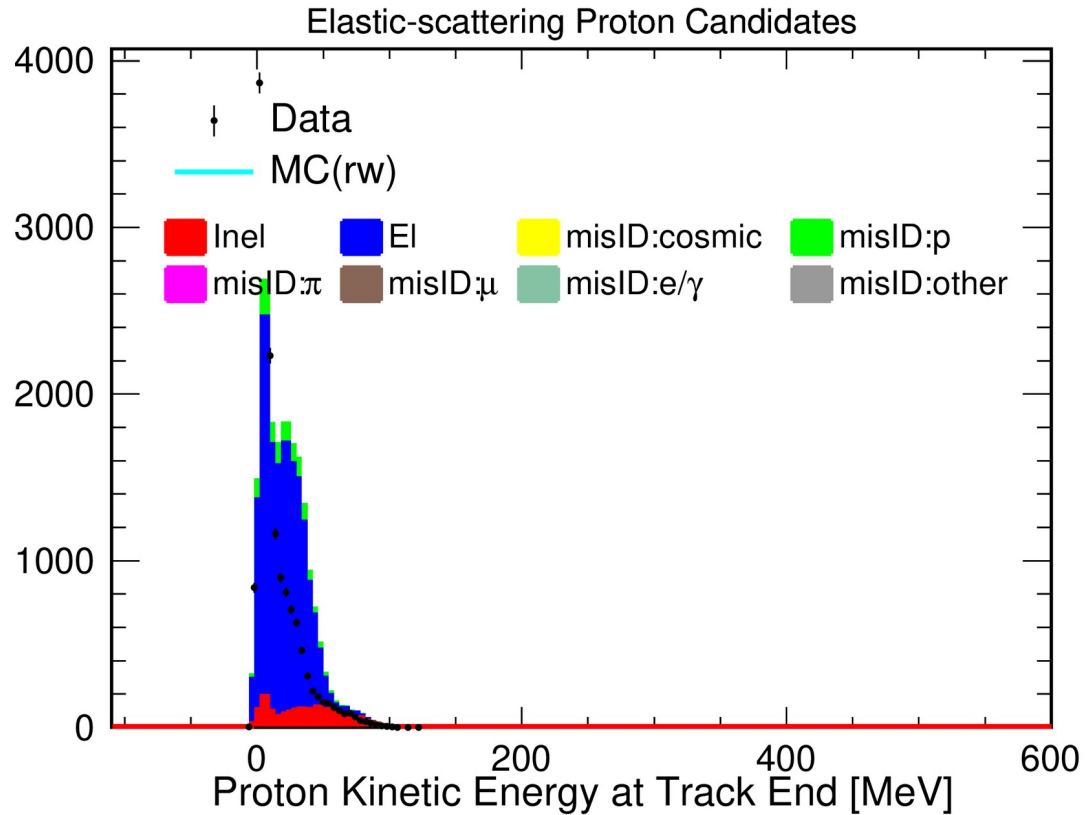
BMRW



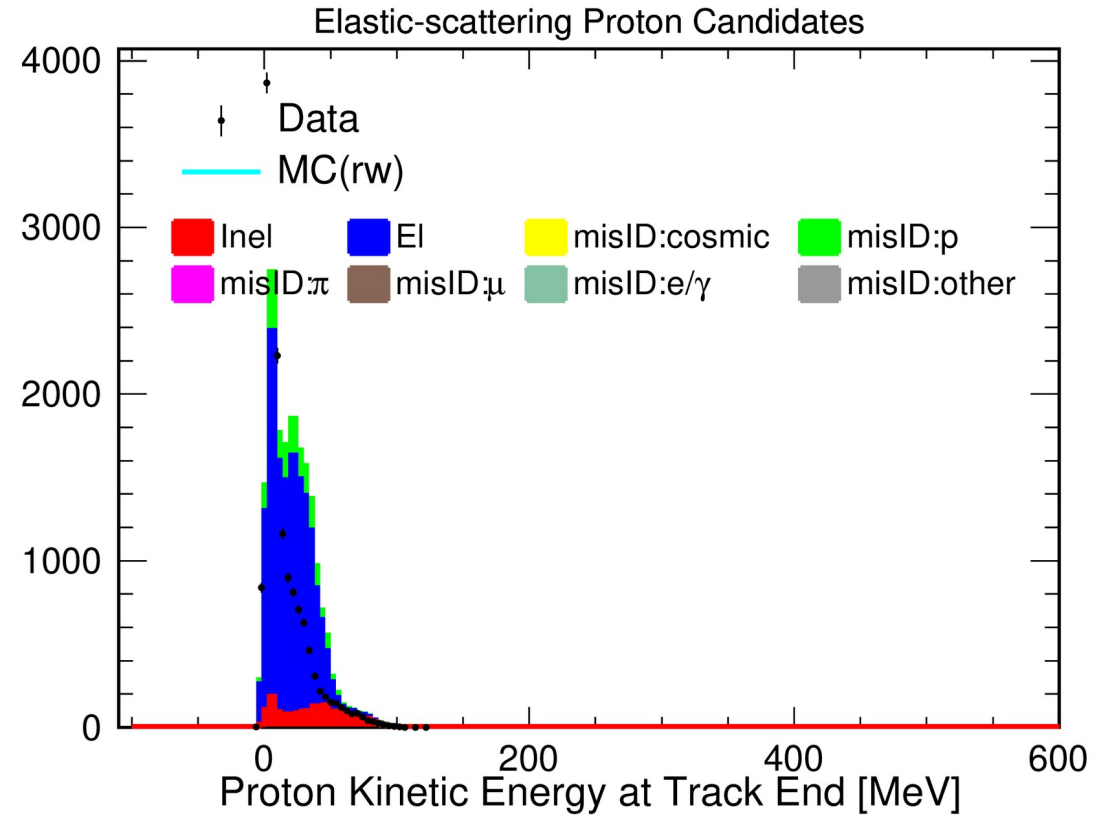
- ▶ Similar pattern (amplification on tail) has observed in inelastic-scattering channel  
→ Need a new weighting function (i.e. defined by using 2 asymmetric functions)

# KE at Interaction: Elastic-scattering Channel

No BMRW



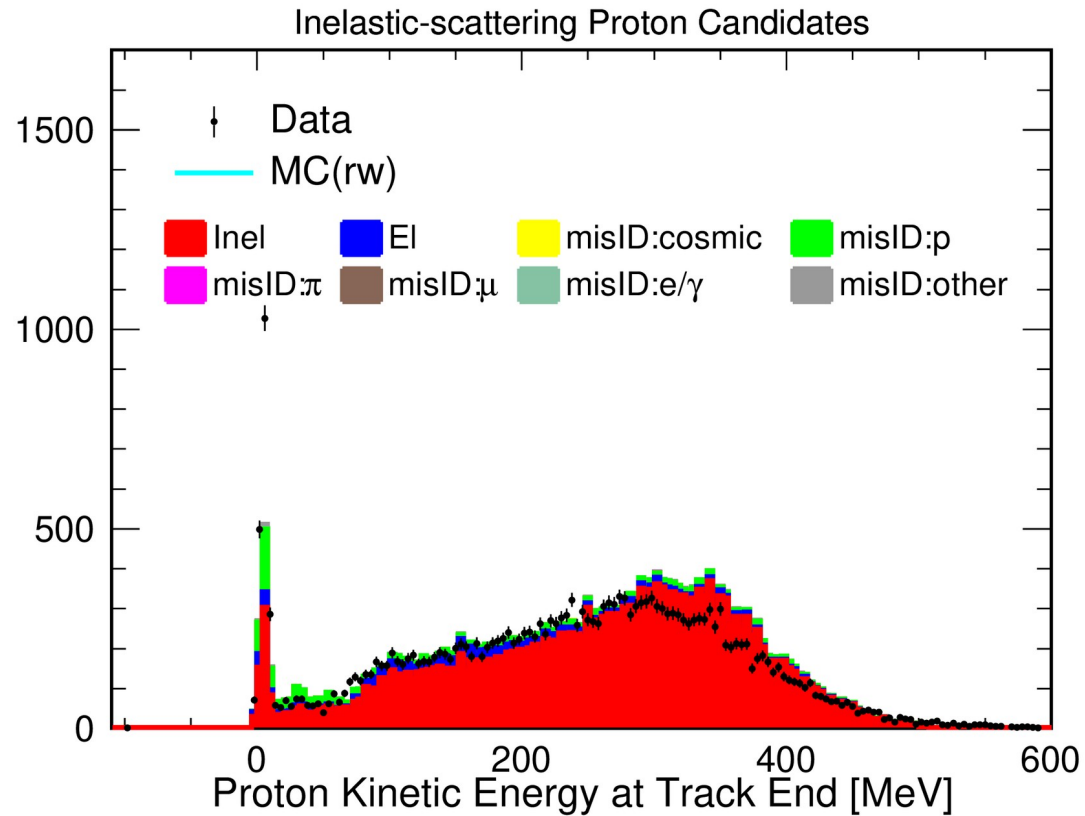
BMRW



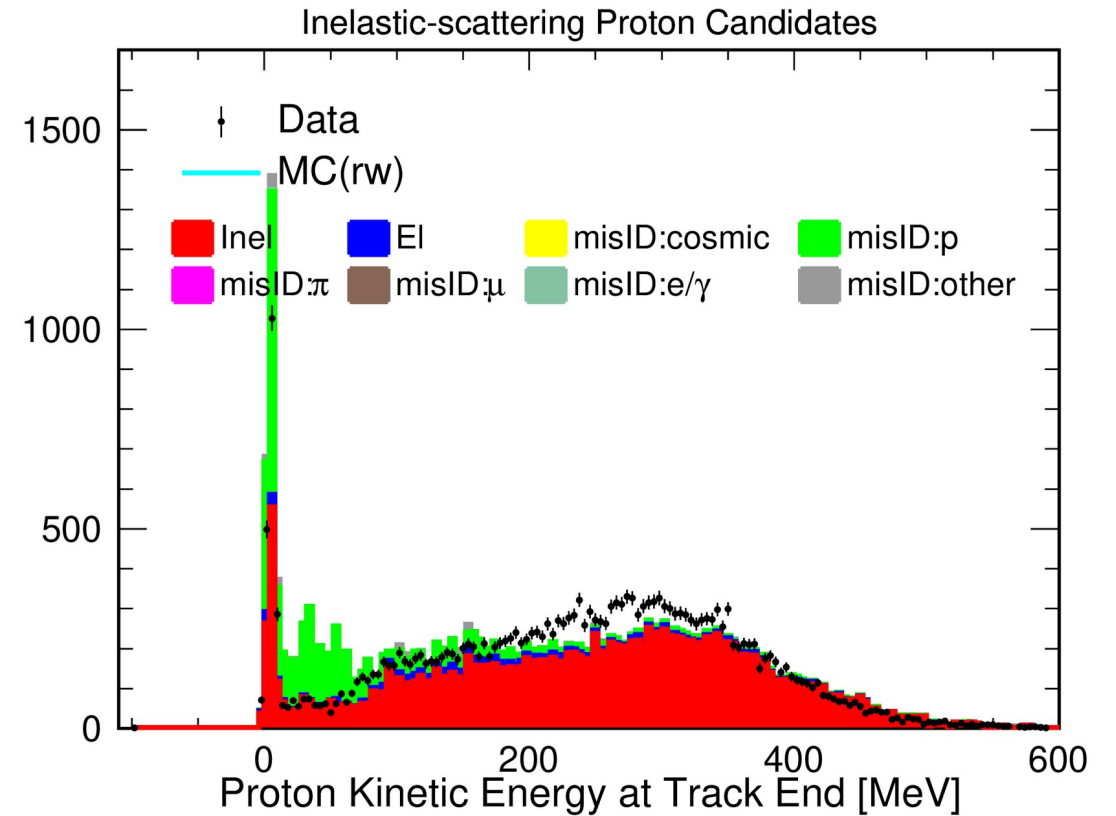
- ▶ Should not be surprised to see data/MC not match  
→ Data/MC  $KE_{ff}$  not match after BMRW

# KE at Interaction: Inelastic-scattering Channel

No BMRW



BMRW

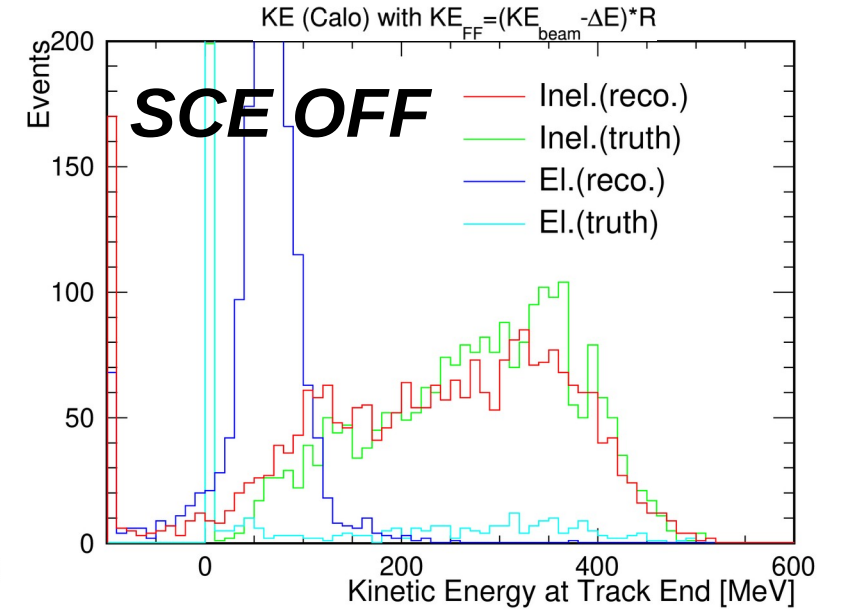
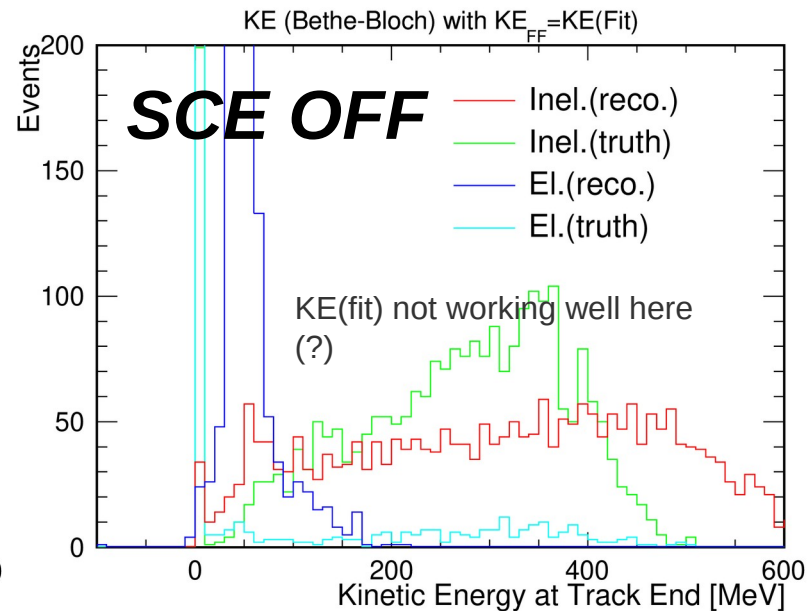
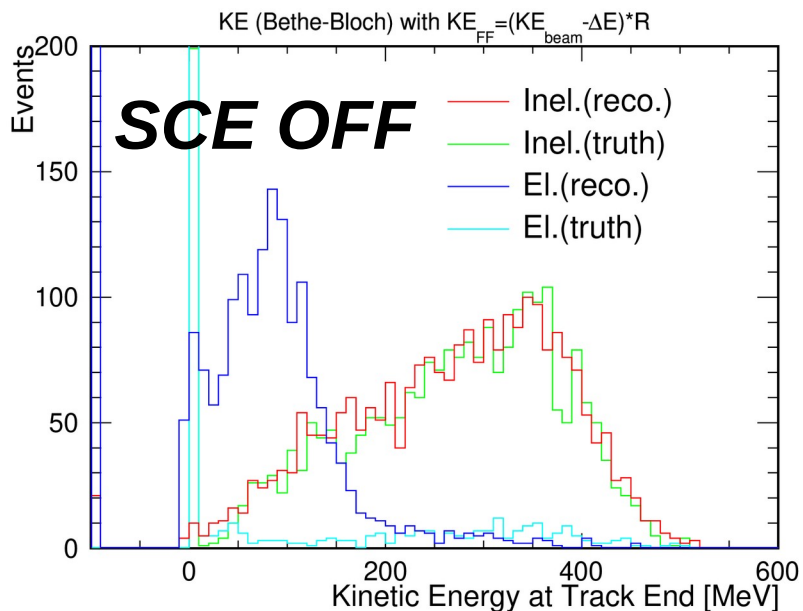
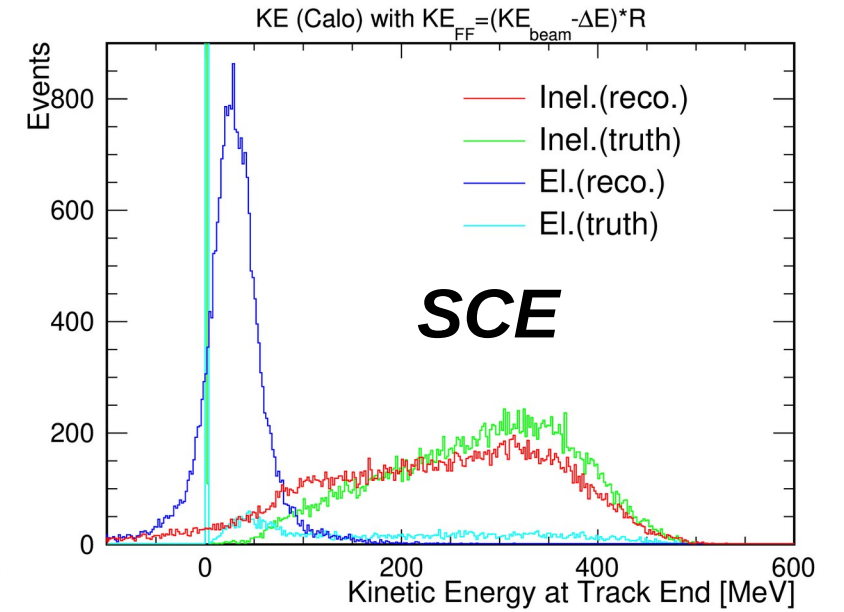
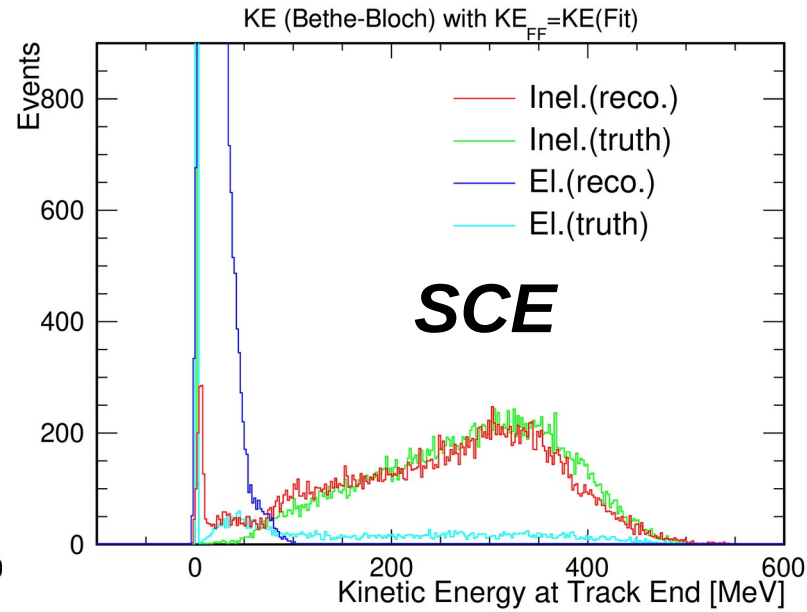
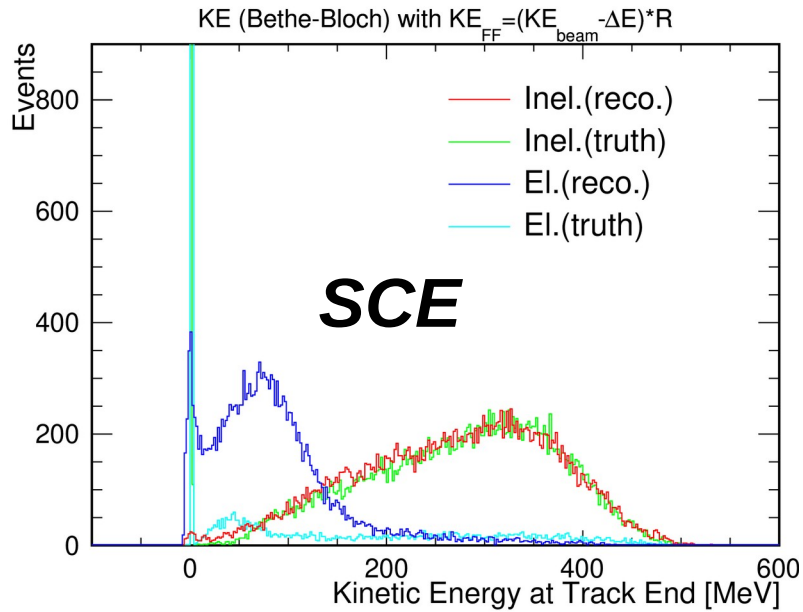


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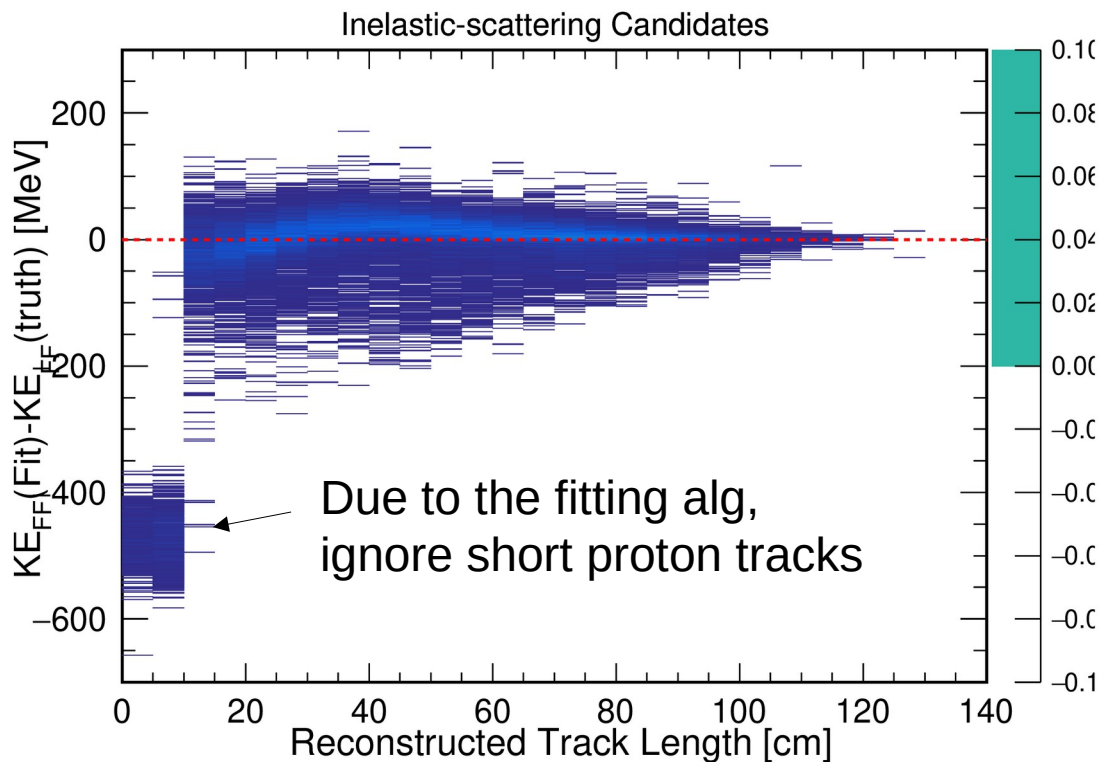
# KE at Interaction: SCE ON/OFF Comparison

Bethe-Bloch

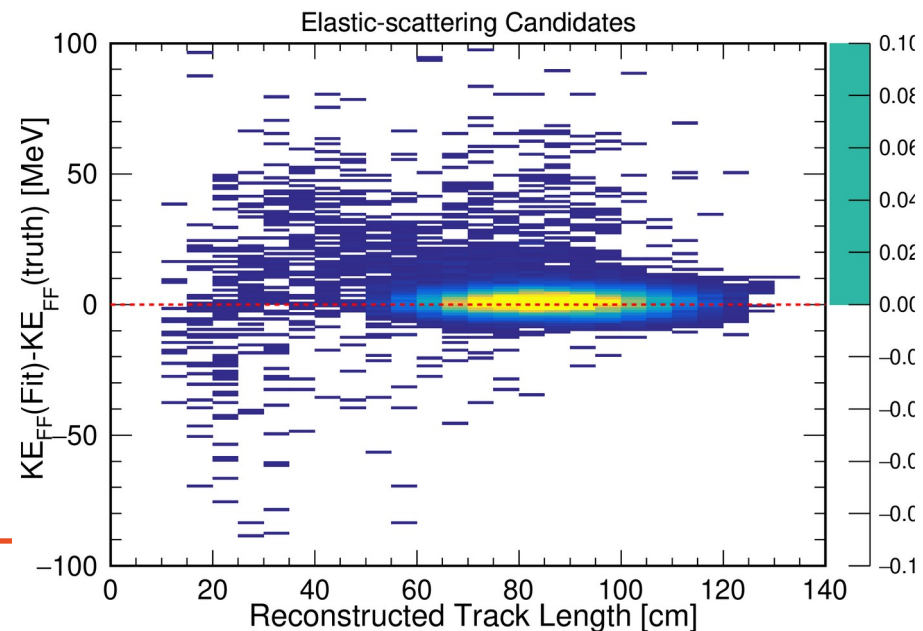
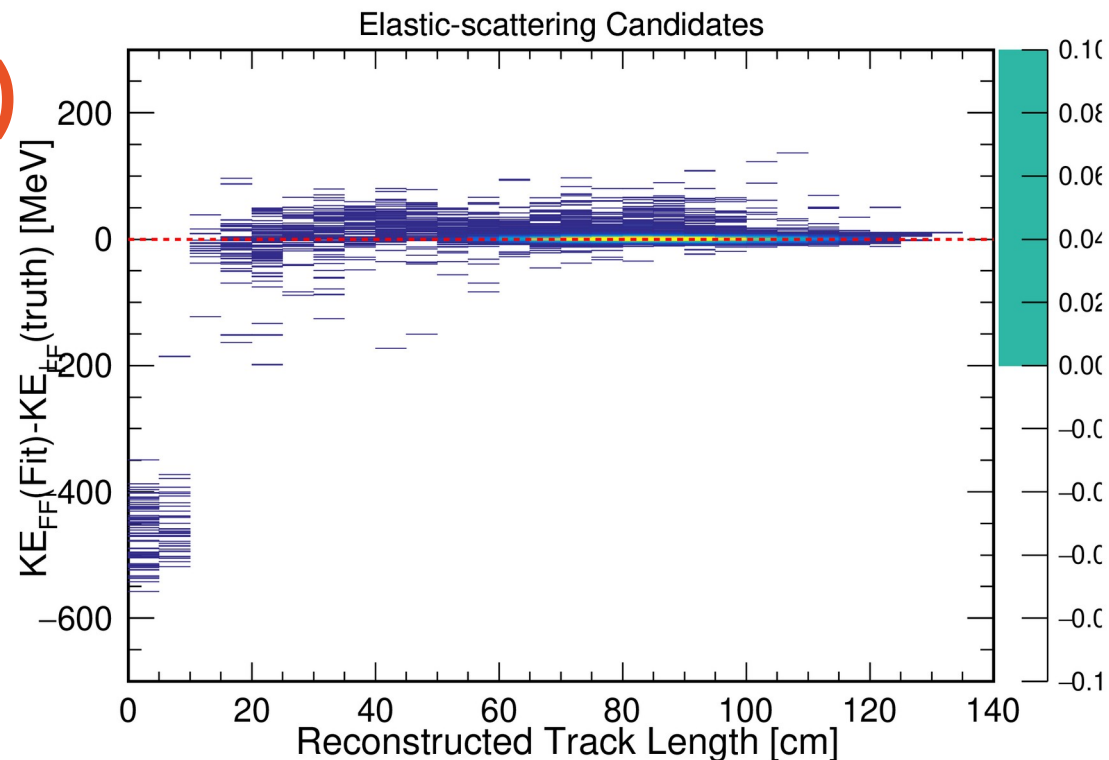
Calorimetry



# $\Delta KE_{ff}$ vs track length: $KE_{ff}=KE(\text{fit})$



```
double dEdx_theory = meandEdx(this_KE);  
double dEdx_measured = dEdx.at(this_index);  
if(dEdx_measured < 0.5 || dEdx_measured > 20.0) continue; // == Truncate, it should be modified to consider protons
```

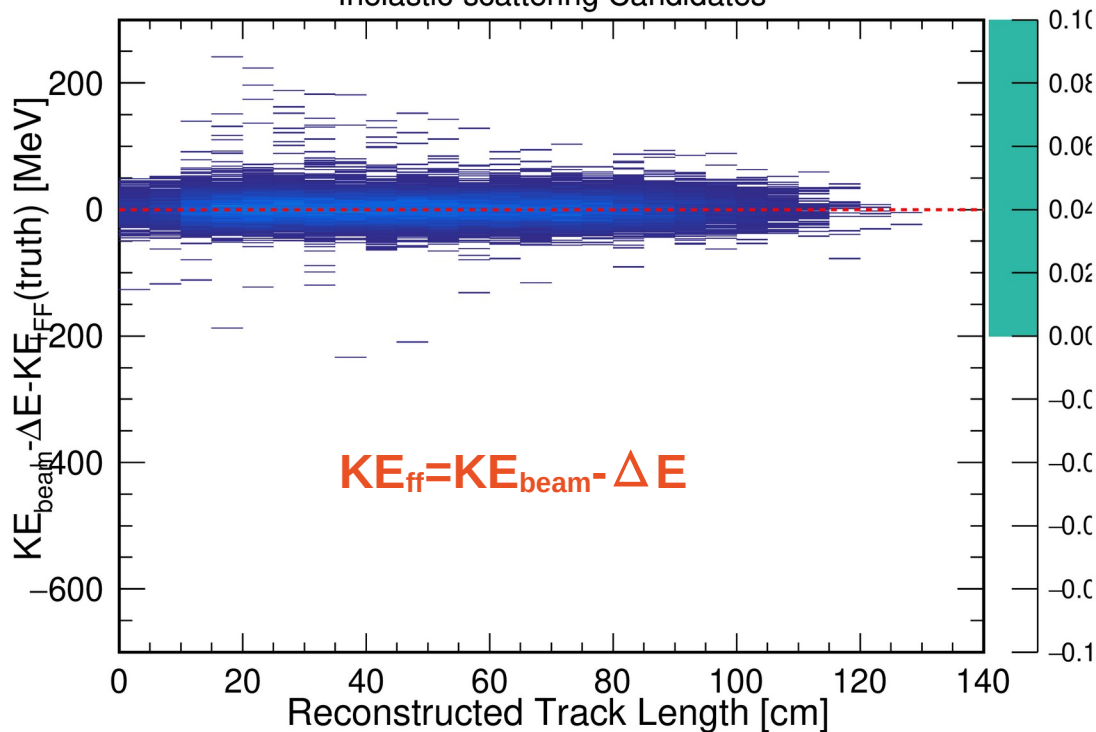




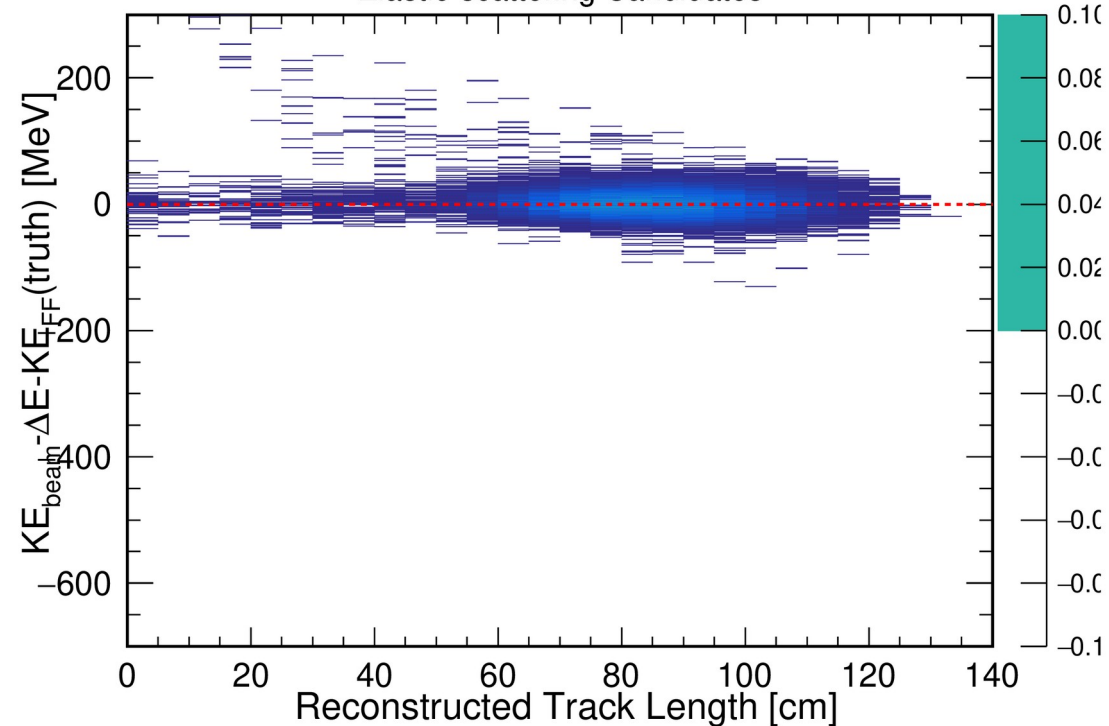
# $\Delta KE_{ff}$ vs track length:

$$KE_{ff} = KE_{beam} - \Delta E$$

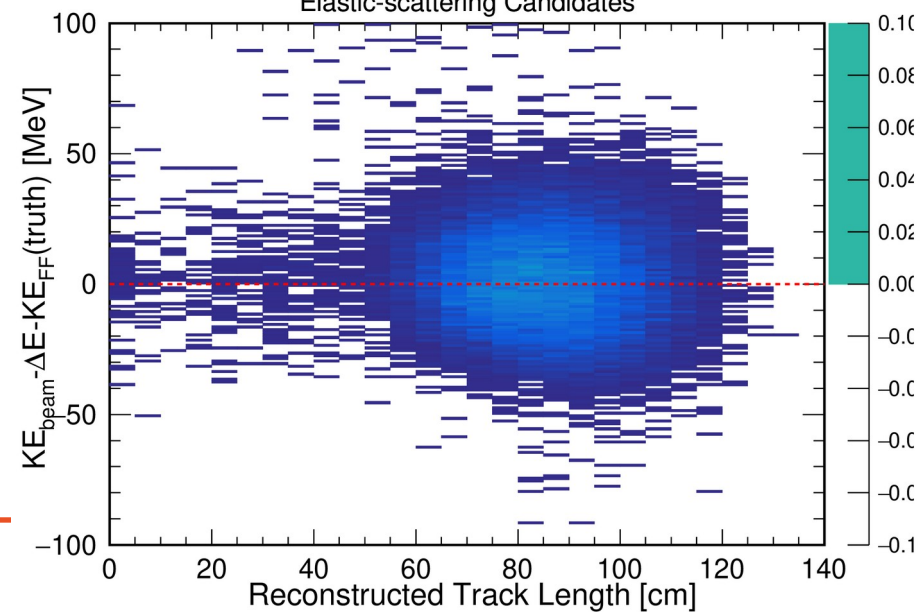
Inelastic-scattering Candidates



Elastic-scattering Candidates



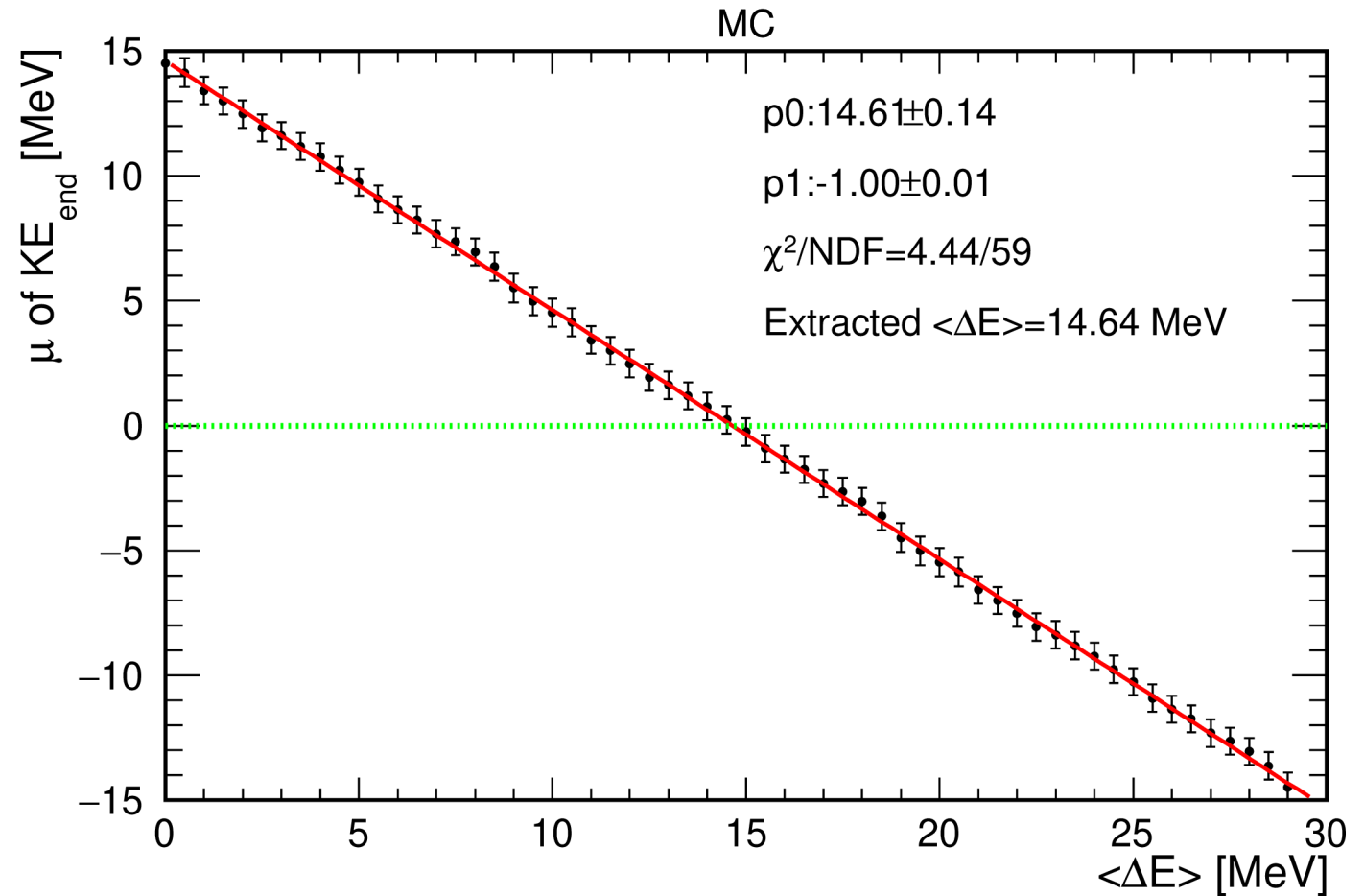
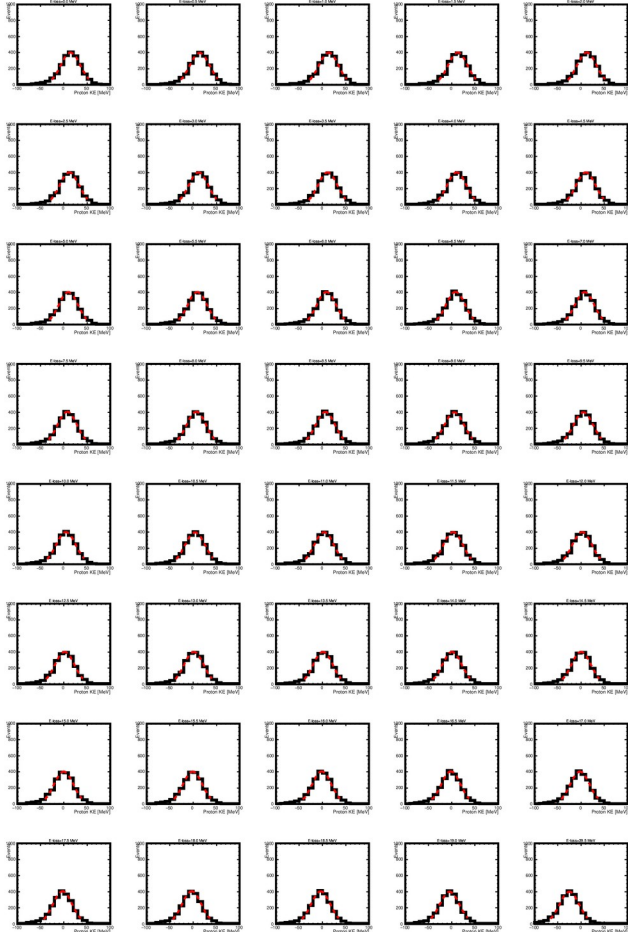
Elastic-scattering Candidates



# Backup

# SCE OFF: E-loss

- ▶ Use scanning method to derive E-loss



# $\Delta KE_{ff}$ vs track length: $KE_{ff}=KE(\text{fit})$

