

# Flip mode emittance analysis update

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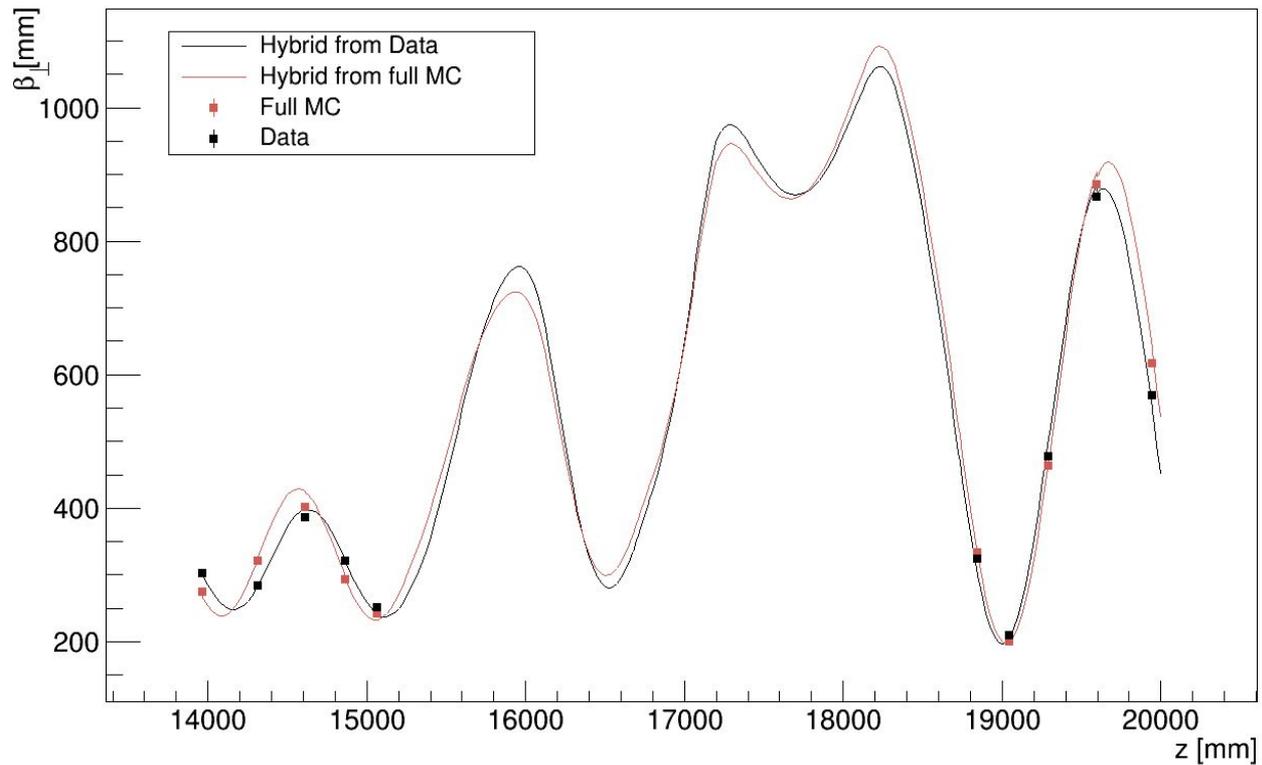
May 1, 2020

ICL Accelerator Meeting

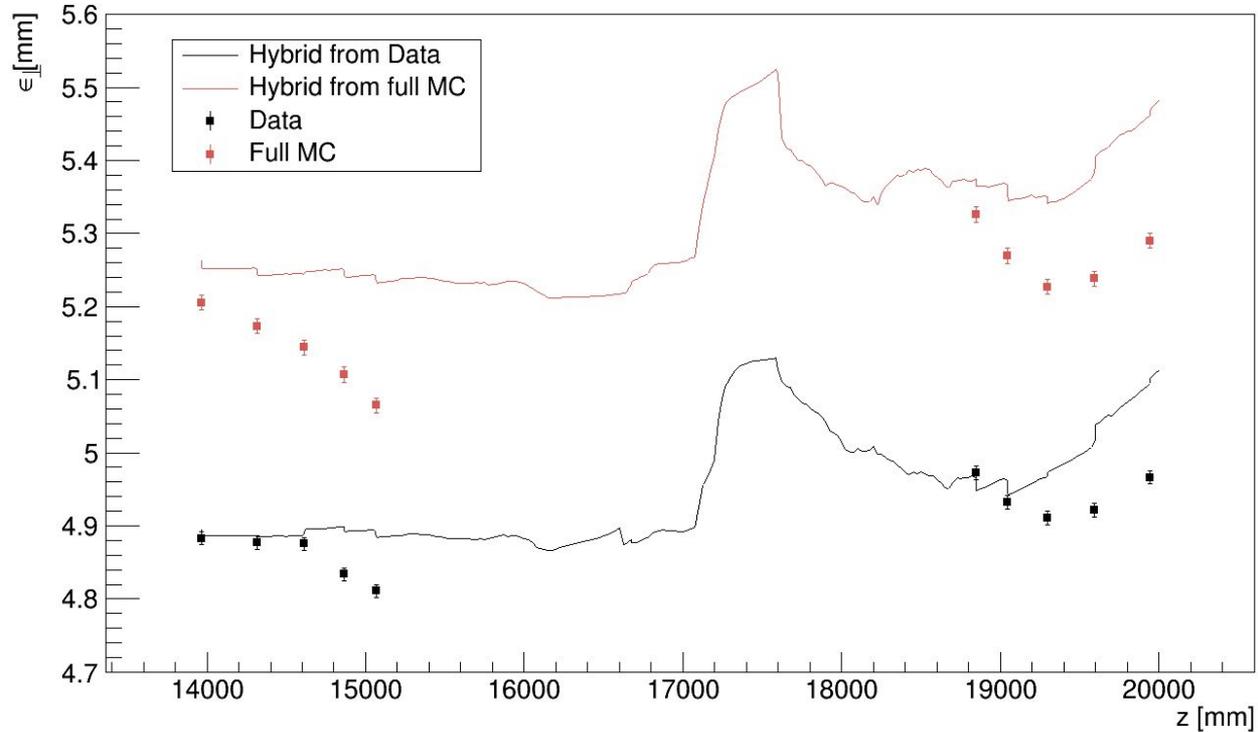
# Hybrid MC (Truth)

- Extracted Data and full MC parent beams at TKU5 and produced hybrid MC simulations
- Simulated 15k particles
- Events in the simulated beams required to pass through all the virtual planes in the cooling channel (from TKU5 to TKD5)

# Betatron function



# Emittance including particle losses in Hybrid MC

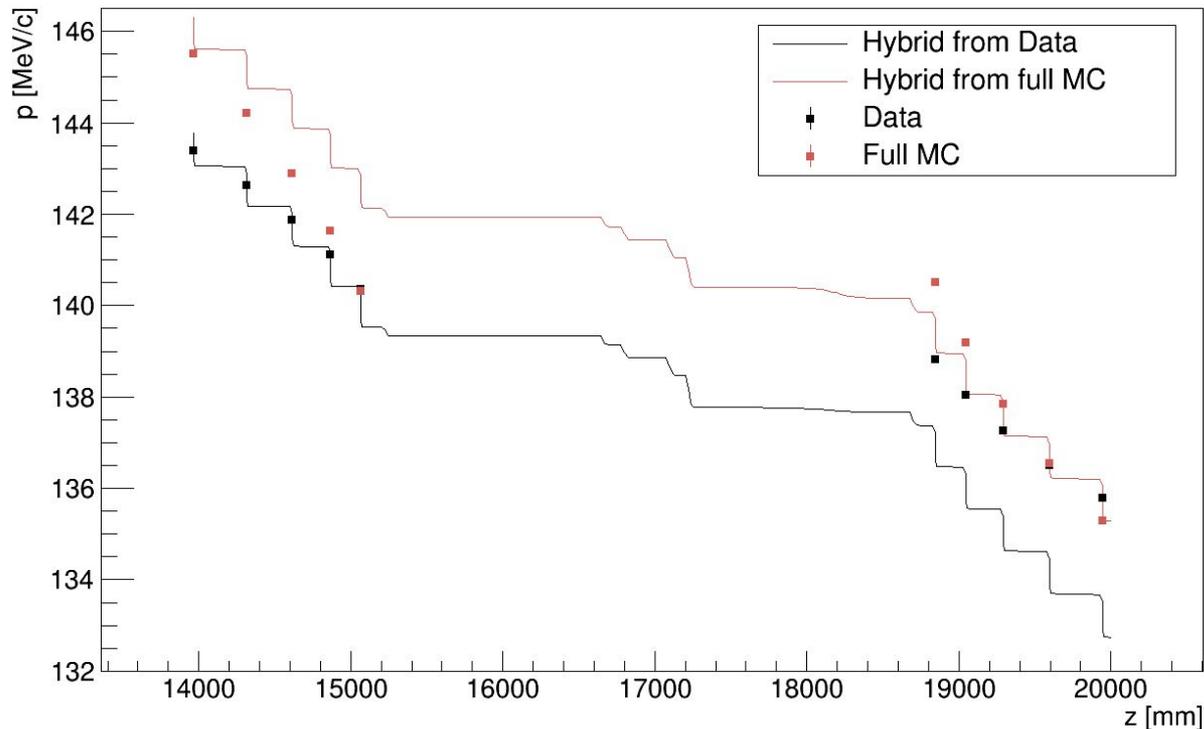


# Momentum

More energy/momentum loss at tracker stations observed in the full MC than in Data. However, while in Data the beam losses 1.6 MeV/c by passing through the vessel windows, there is no loss (0.2 MeV/c 'gain') in the full MC.

Also, the energy loss at *tracker stations* in the full MC is greater than the loss observed in the Hybrid MC. I am aware the glue density in the tracker stations was changed in the full MC -> are the trackers descriptions the same in CR's full MC and my Hybrid MC?

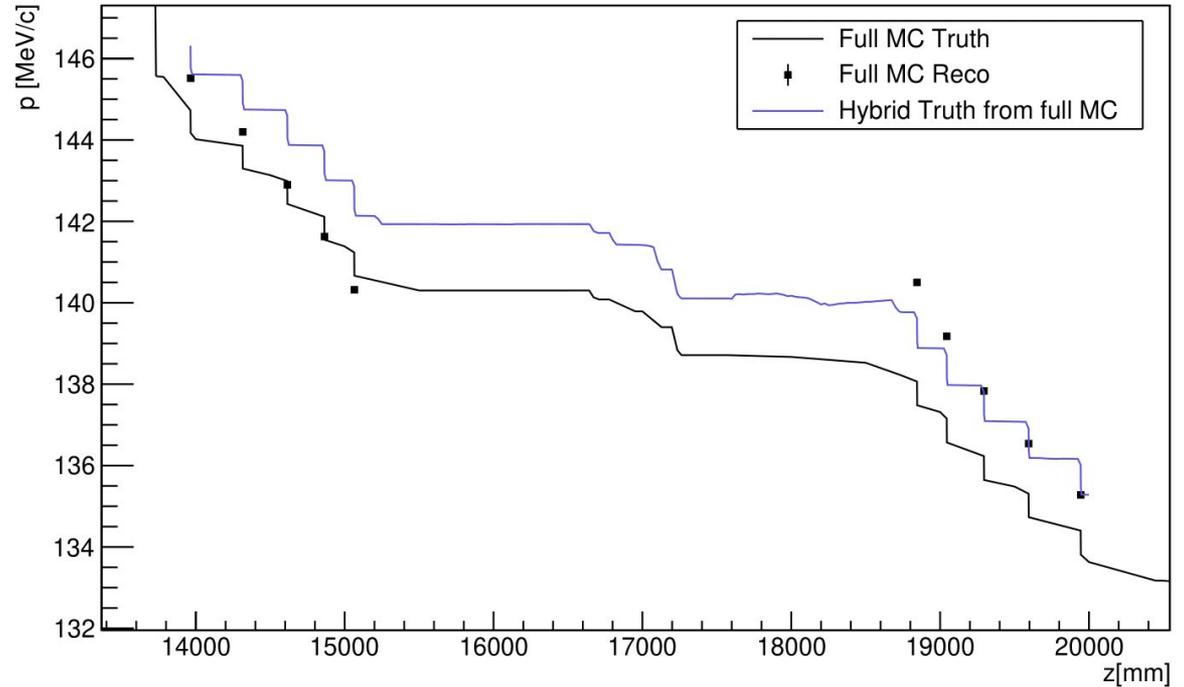
Also, the Hybrid MC observes the presence of the vessel.



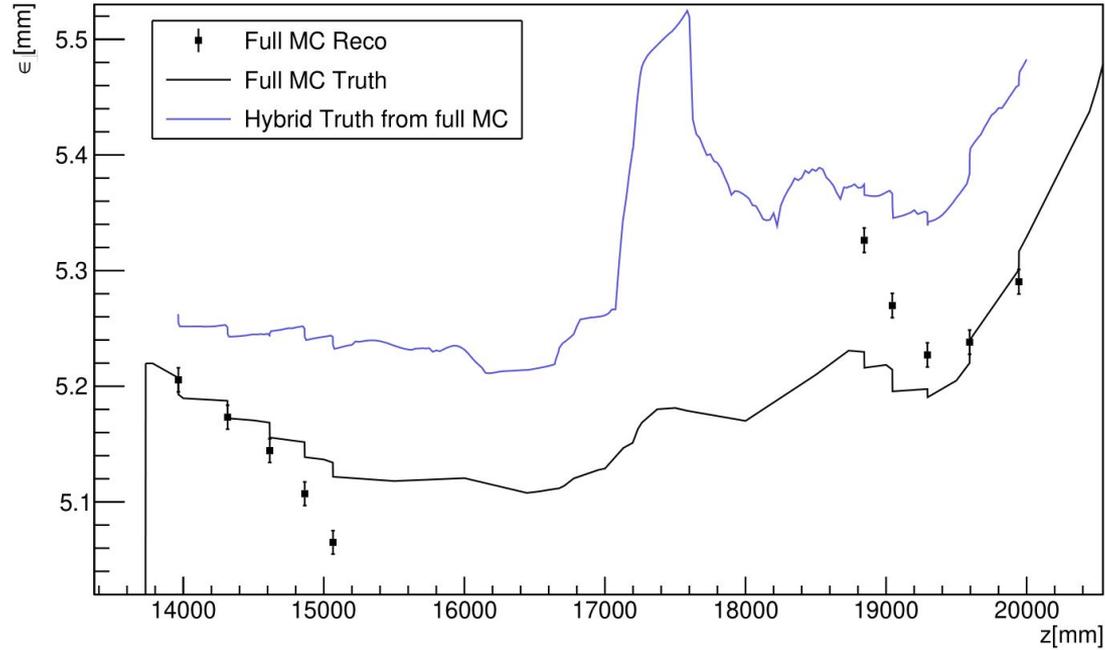
# Full MC: Momentum Update

Same momentum loss  
observed in Full MC Truth  
and Hybrid Truth ->  
descriptions consistent  
between the two

Biased reconstruction

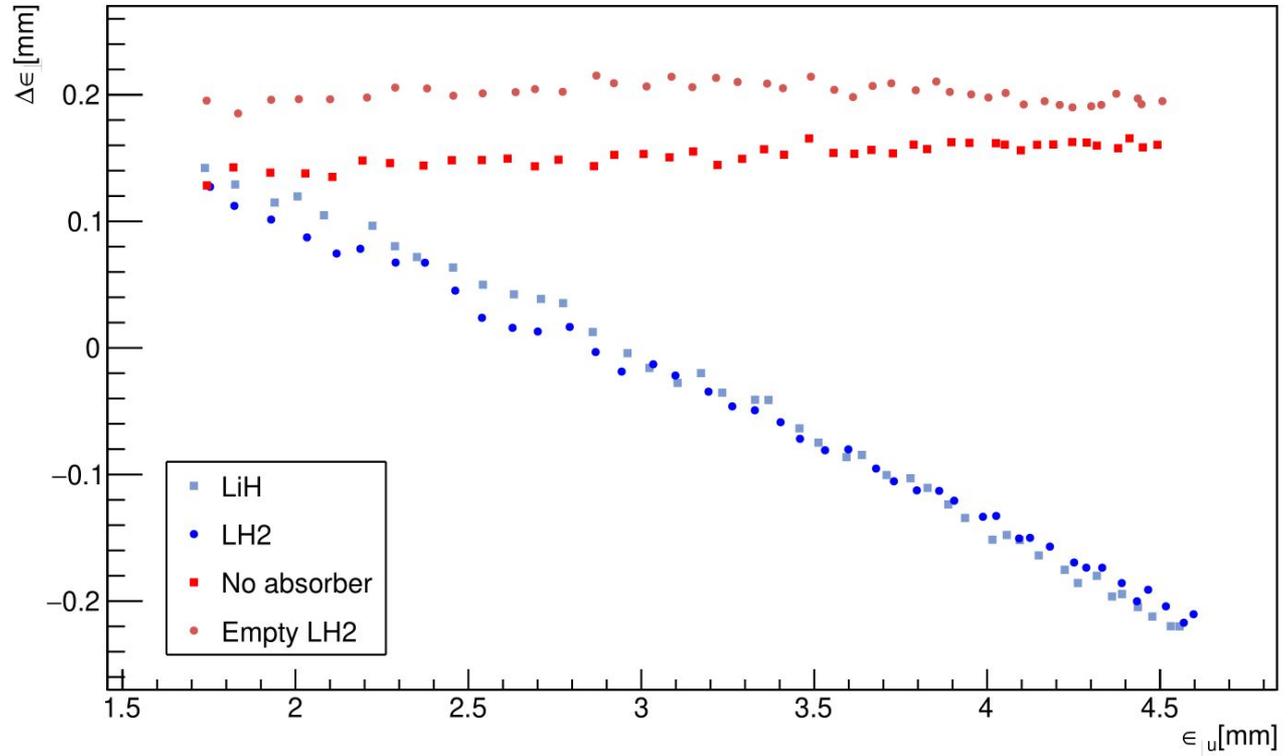


# Full MC: Emittance Update

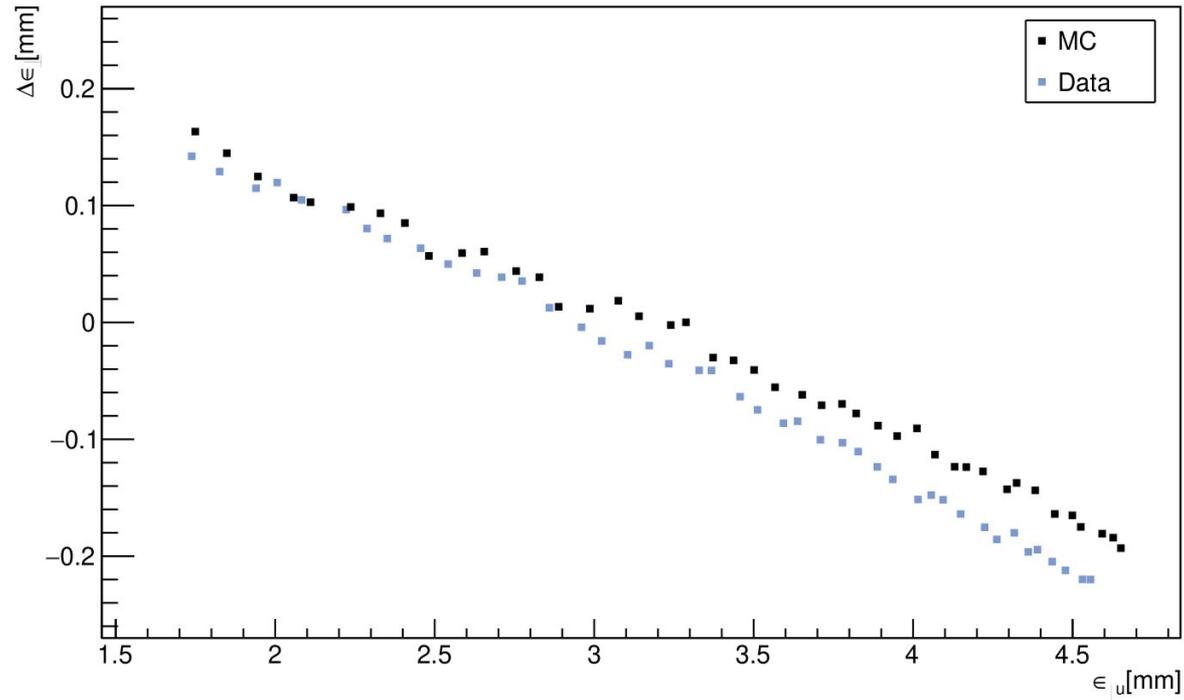


# High level analysis update

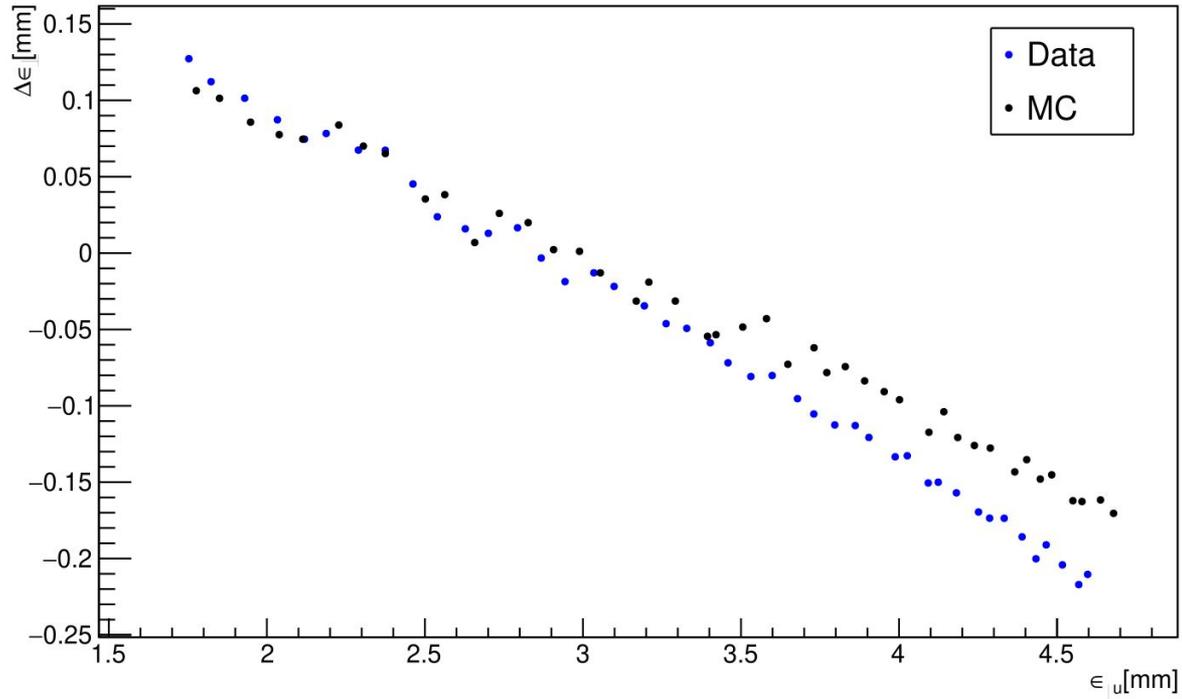
LiH analysis added



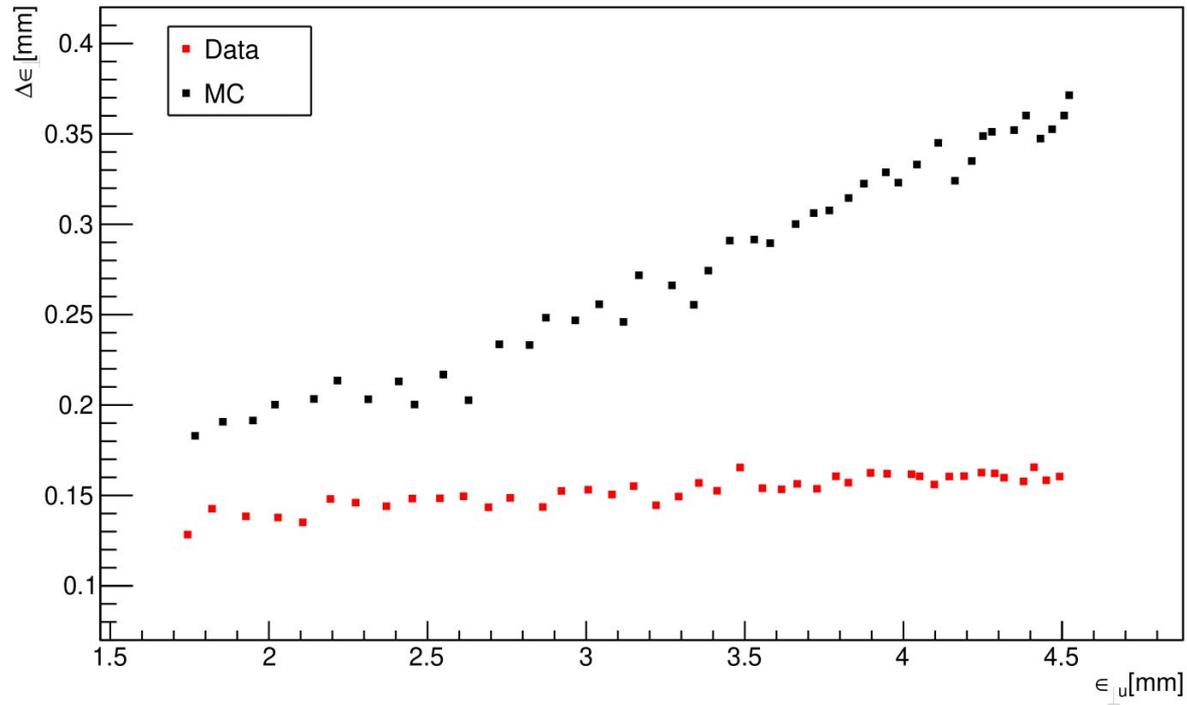
# Data vs CR Full MC: LiH



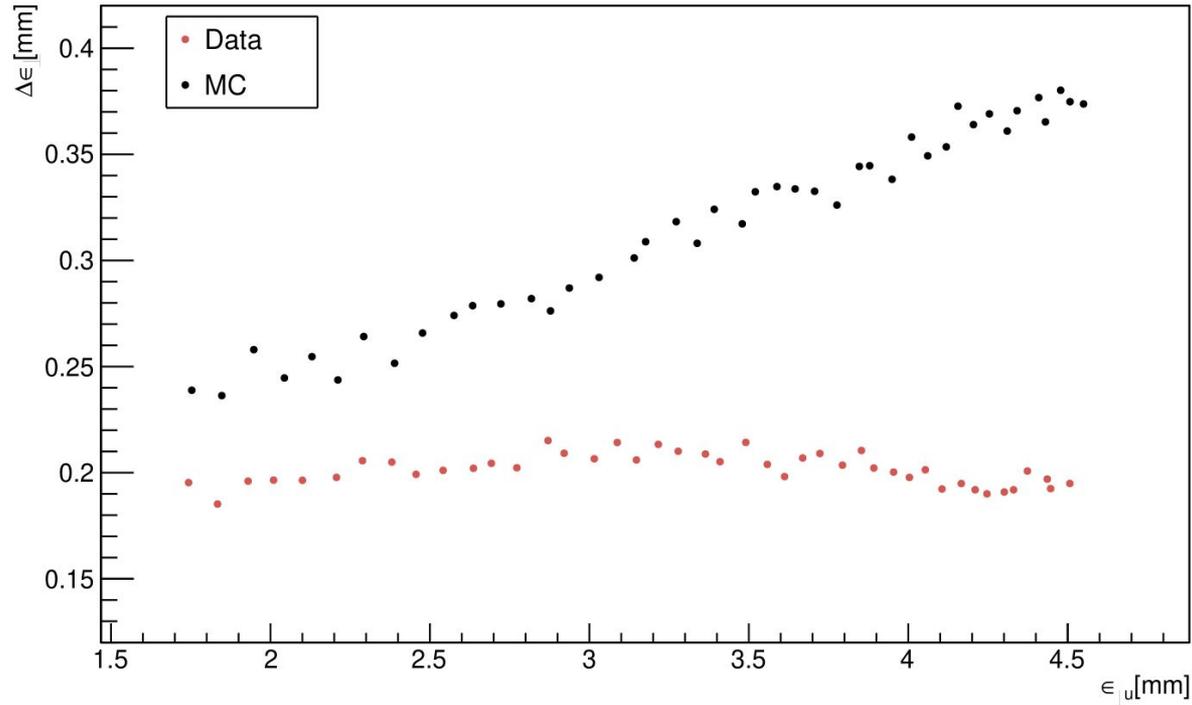
# Data vs CR Full MC: LH2



# Data vs CR Full MC: No absorber



# Data vs CR Full MC: Empty LH2 vessel



# Rejection Sampling Update

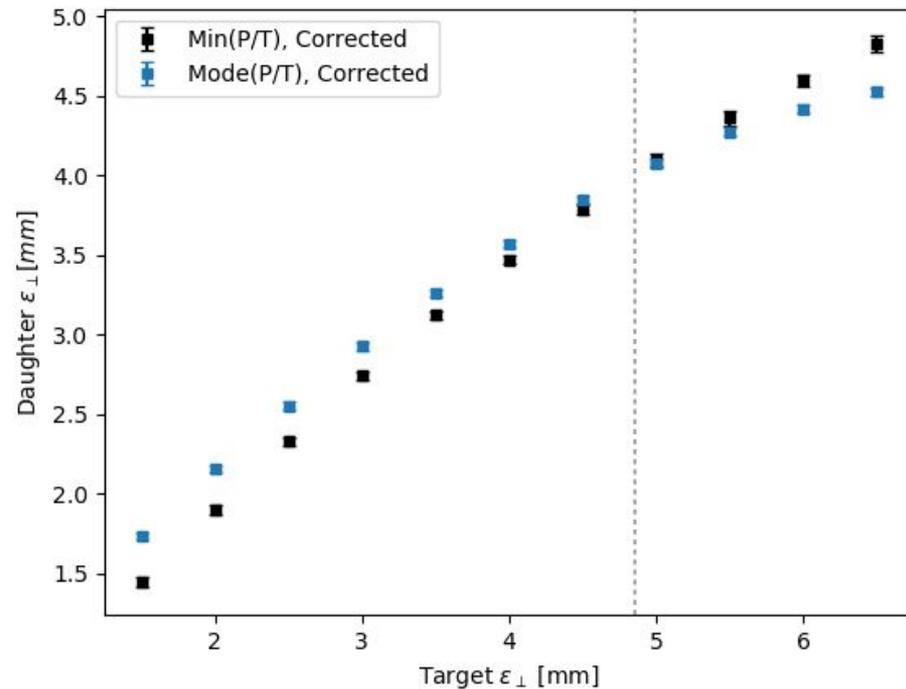
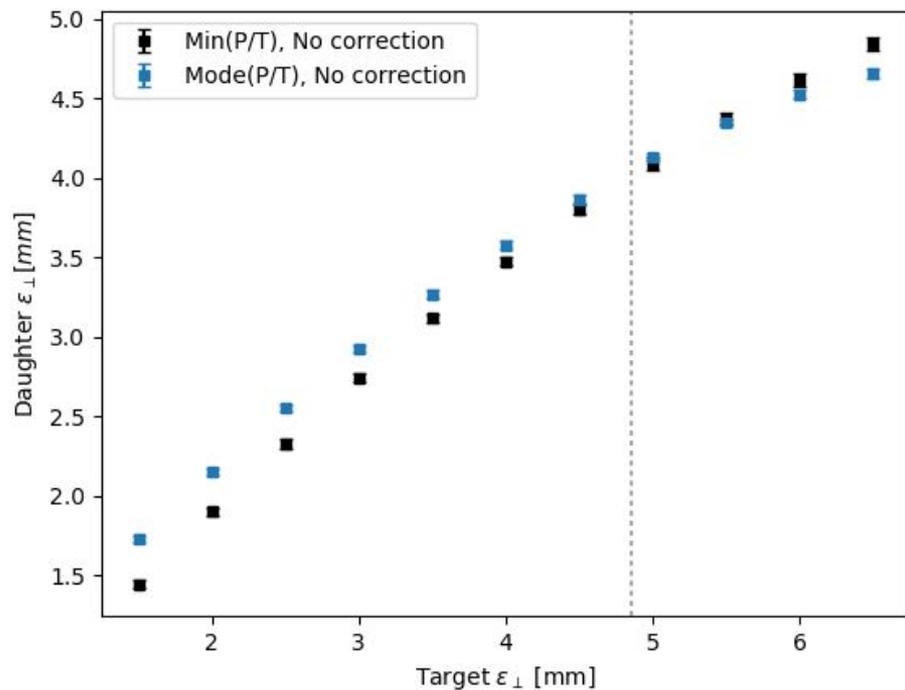
Generated parent beams with a specific set of parameters: [ $\epsilon=4.85$  mm,  $\beta = 282$  mm,  $\alpha = 0.045$ ,  $L = 1.1$ ]

Target parameters: [ $\epsilon= [1.5 - 6.5; 0.5]$  mm,  $\beta = 310$  mm,  $\alpha = 0.0$ ,  $L = 1.1$ ]

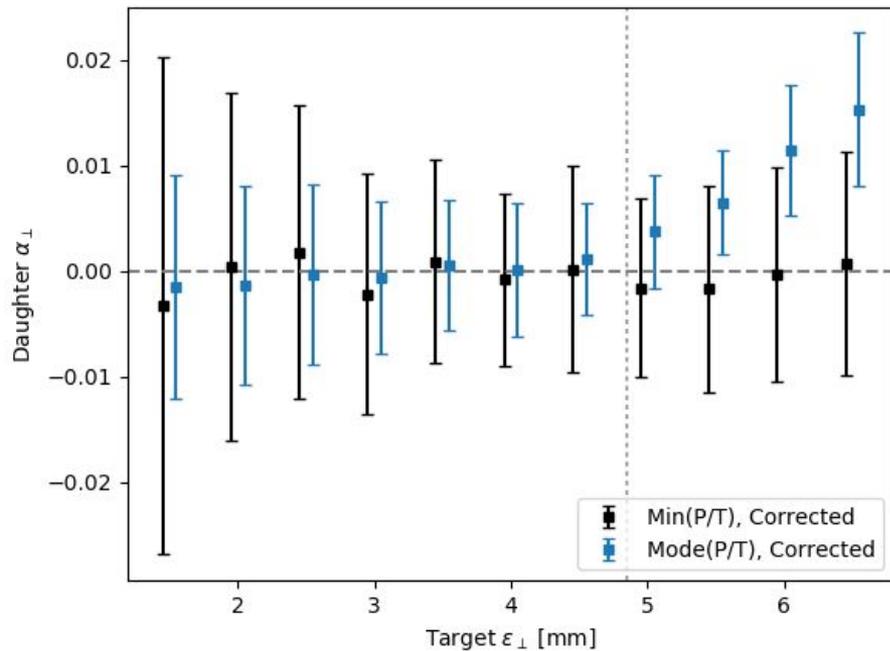
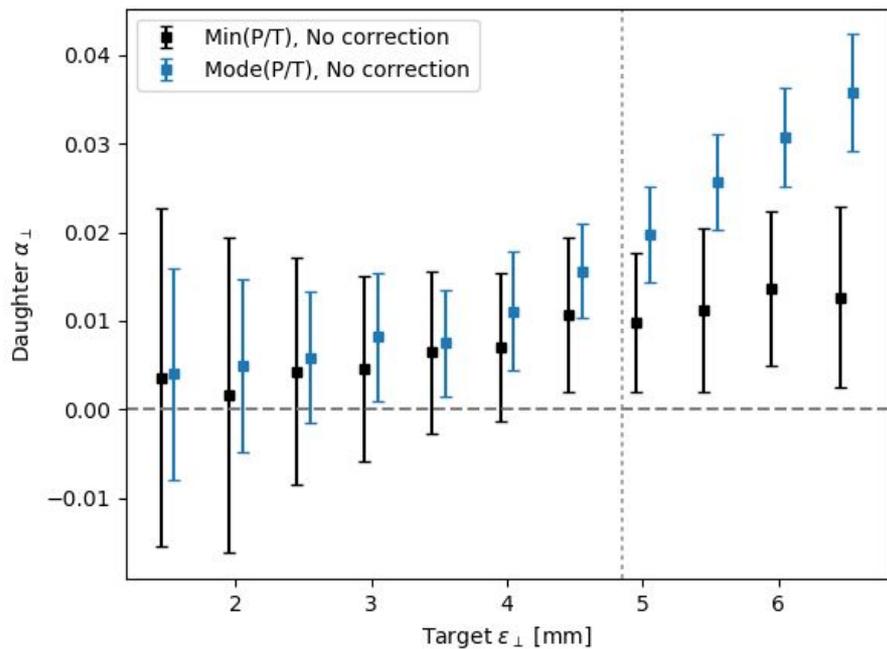
For each combination of parent and target parameters, repeated procedure 100 times

Update: applied correction to the  $\alpha$ ,  $\beta$  target parameters in order to obtain daughter values close to  $\alpha = 0.0$  and  $\beta = 310$  mm

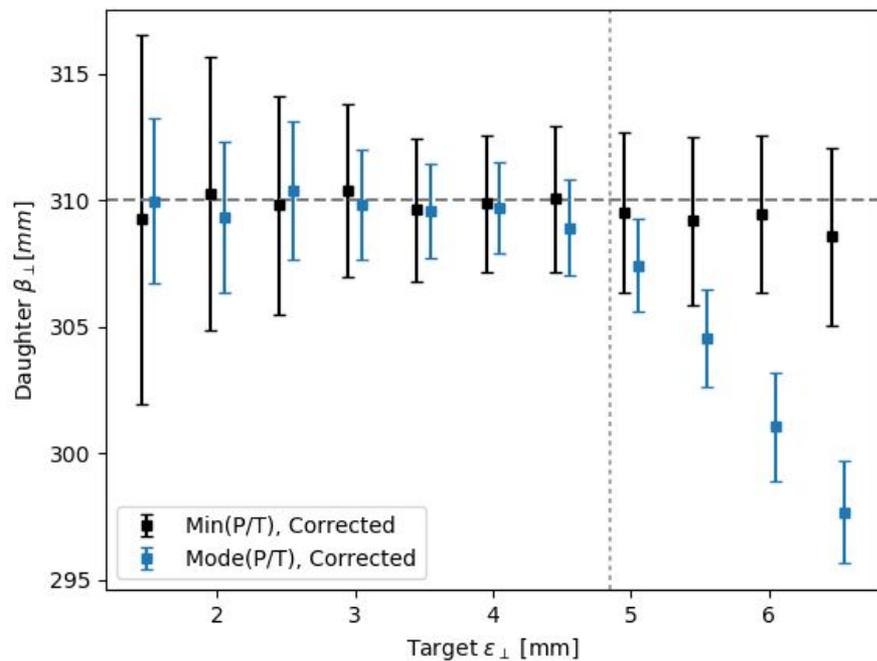
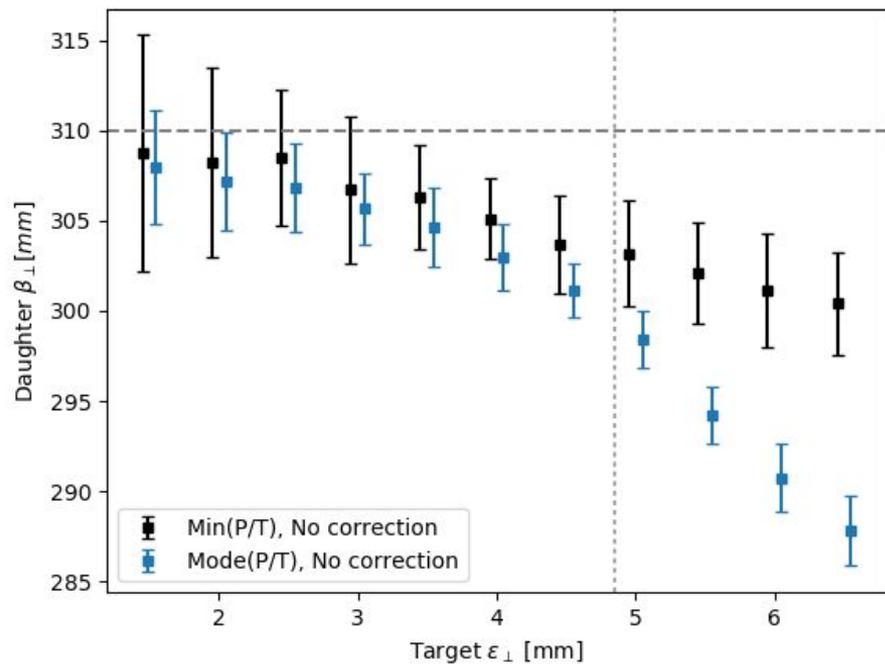
# Emittance



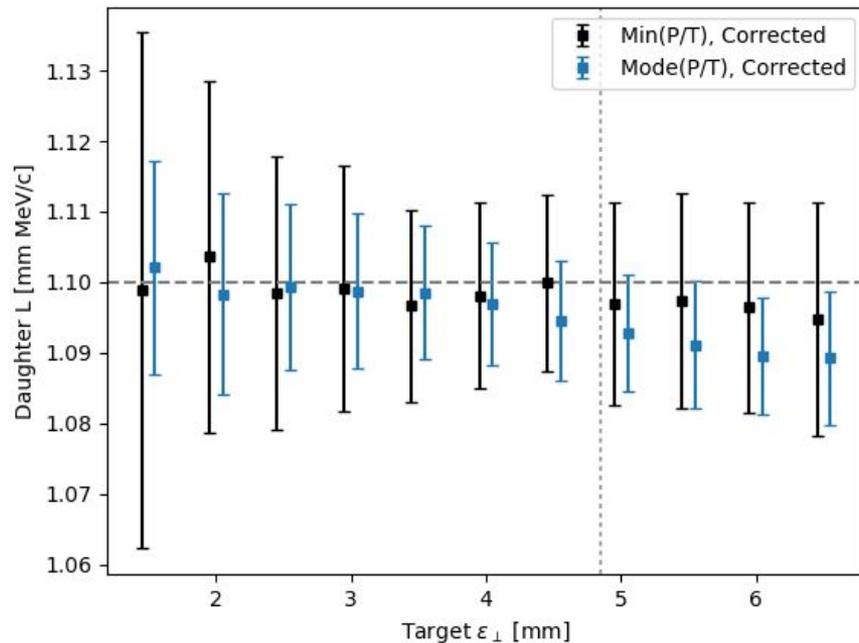
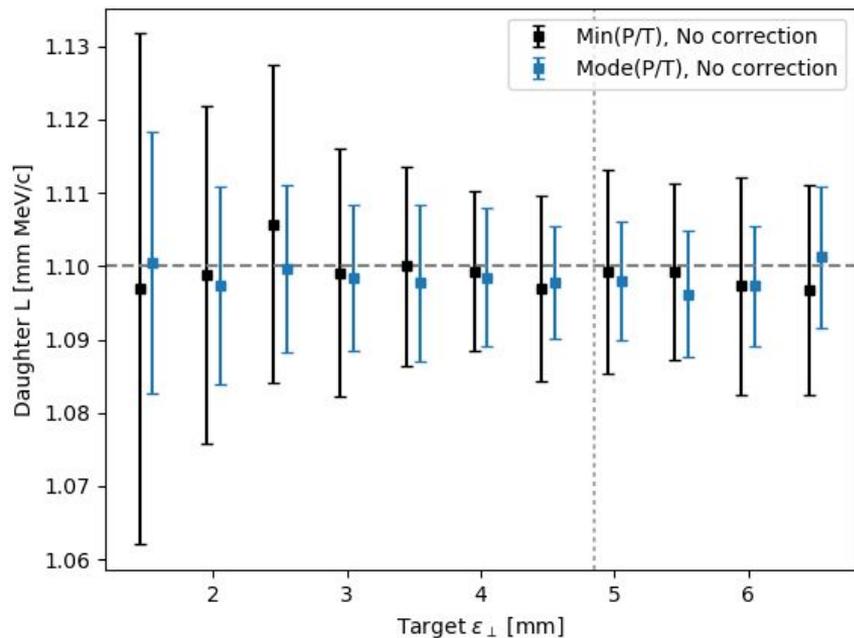
# Alpha



# Beta



# Angular momentum term



# Number of sampled particles

