

ECal & Track X Position Disagreement Update

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3/5/24

Motivation

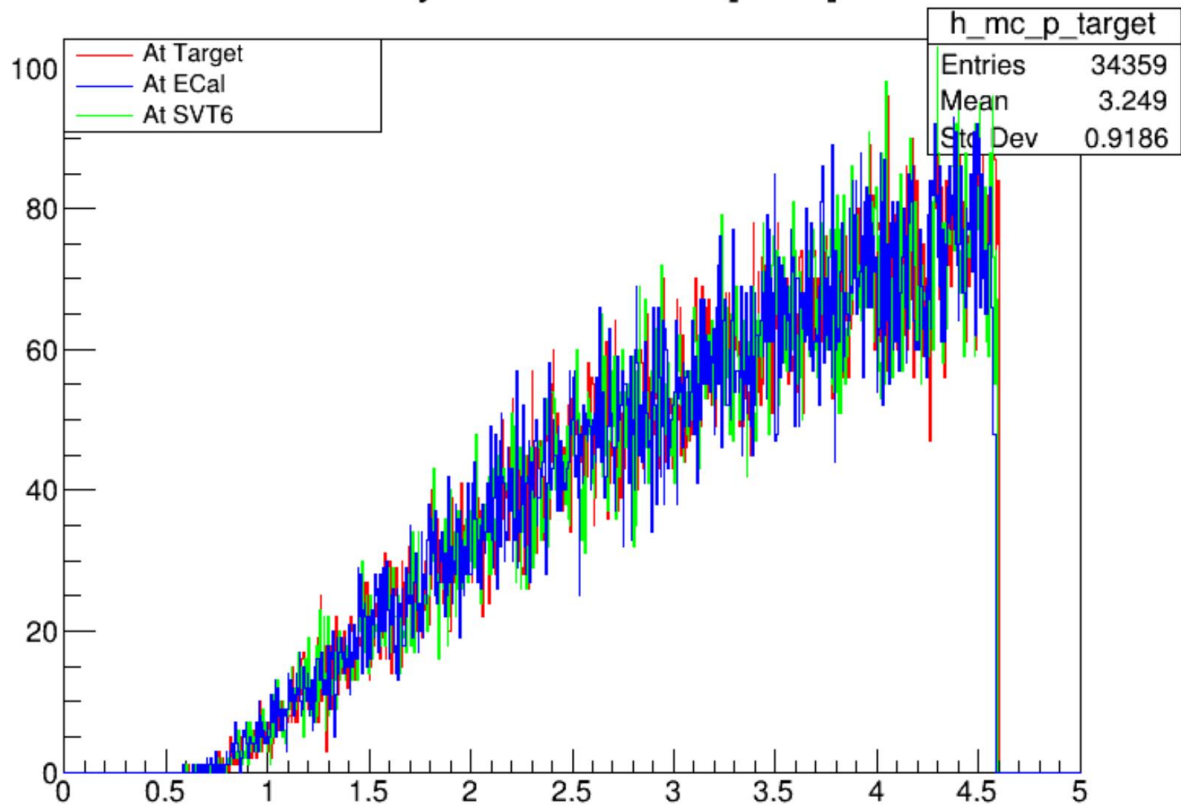
- Discrepancies between Ecal X and track X(at ecal) positions have been noticed for some time
 - Note that Y does not seem to have this issue
- Maurik and I looked at this discrepancy with MC muons to first see if momentum loss of the particle was the source of this discrepancy

Data Efficiency and cut flow

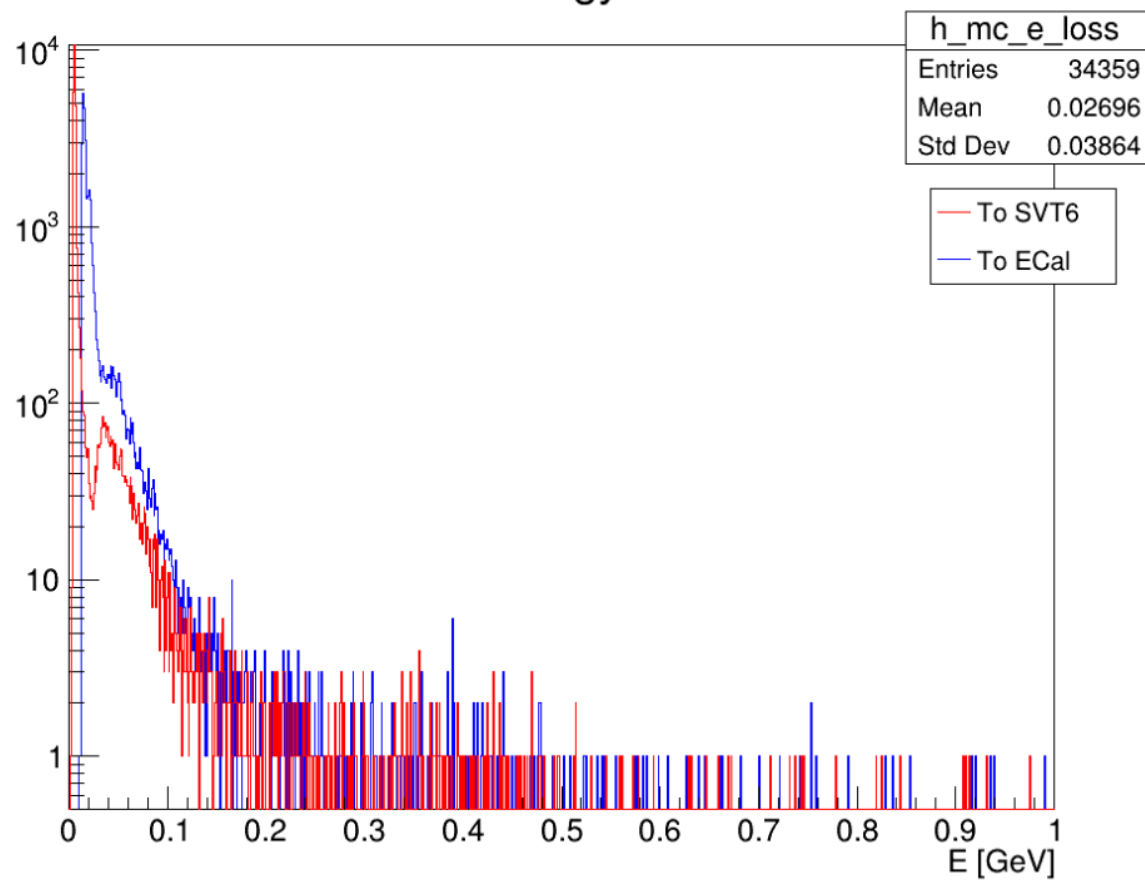
```
Select only 1 Primary MC particle: pass=251224    all=251509    -- eff=99.89 % cumulative eff=99.89 %
Select only 1 KF track.: pass=95638             all=251224    -- eff=38.07 % cumulative eff=38.03 %
Select only 1 Primary MC particle at ECal: pass=82800    all=95638     -- eff=86.58 % cumulative eff=32.92 %
Select only 1 Primary MC particle at SVT6: pass=35381    all=82800     -- eff=42.73 % cumulative eff=14.07 %
Select only 1 ECal cluster: pass=34359          all=35381     -- eff=97.11 % cumulative eff=13.66 %
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- We want to be sure that a single muon went through the detector and made it to the ecal, so we perform a series of cuts to ensure this

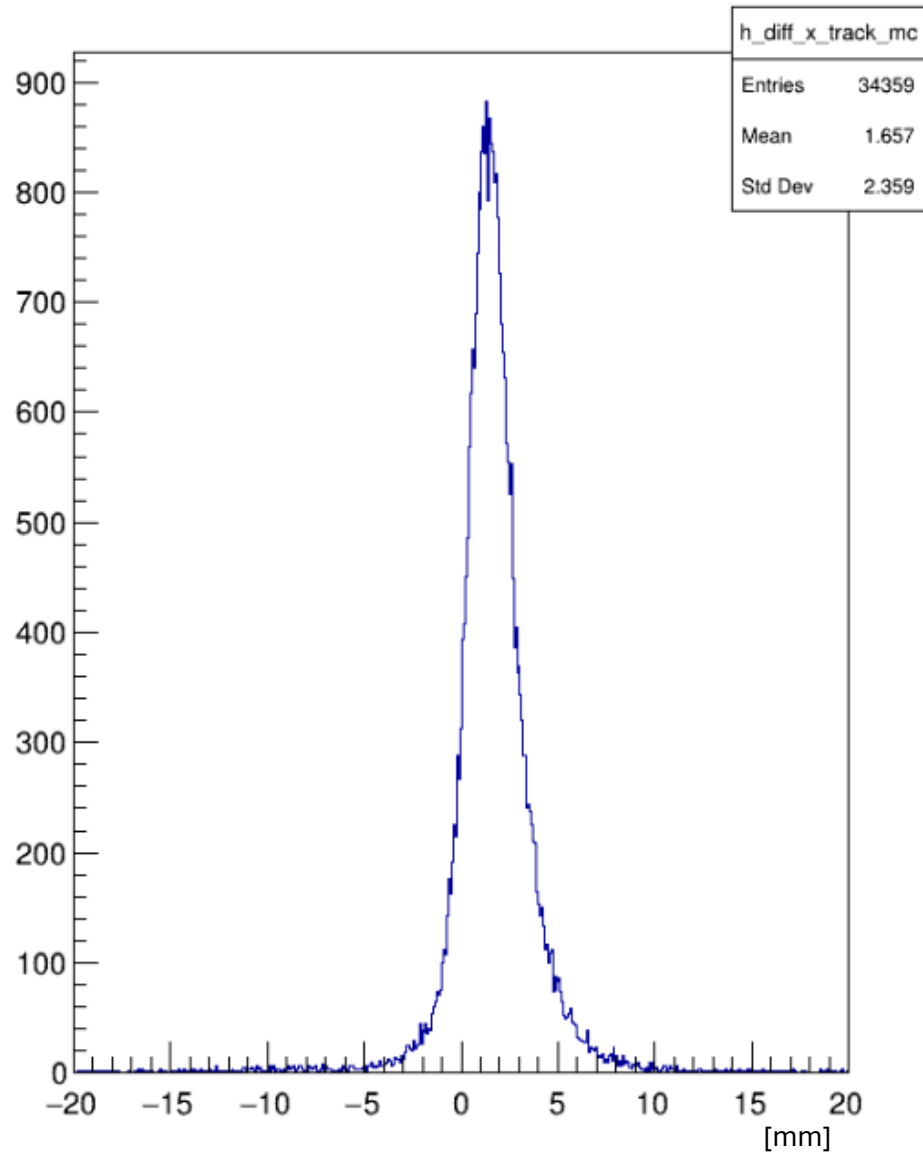
Primary MC Momenta [GeV]



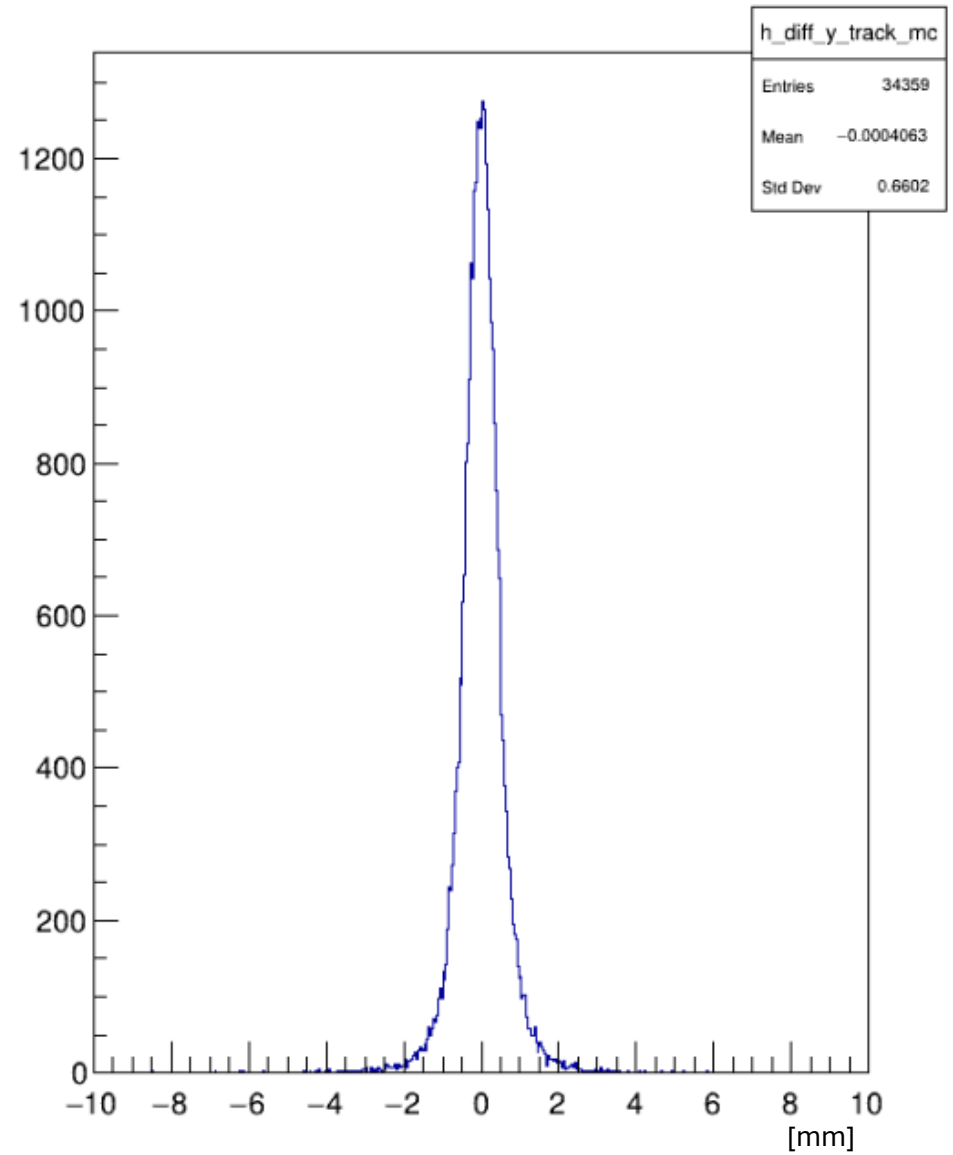
MC Energy Loss



MC X at Ecal - Track X at Ecal



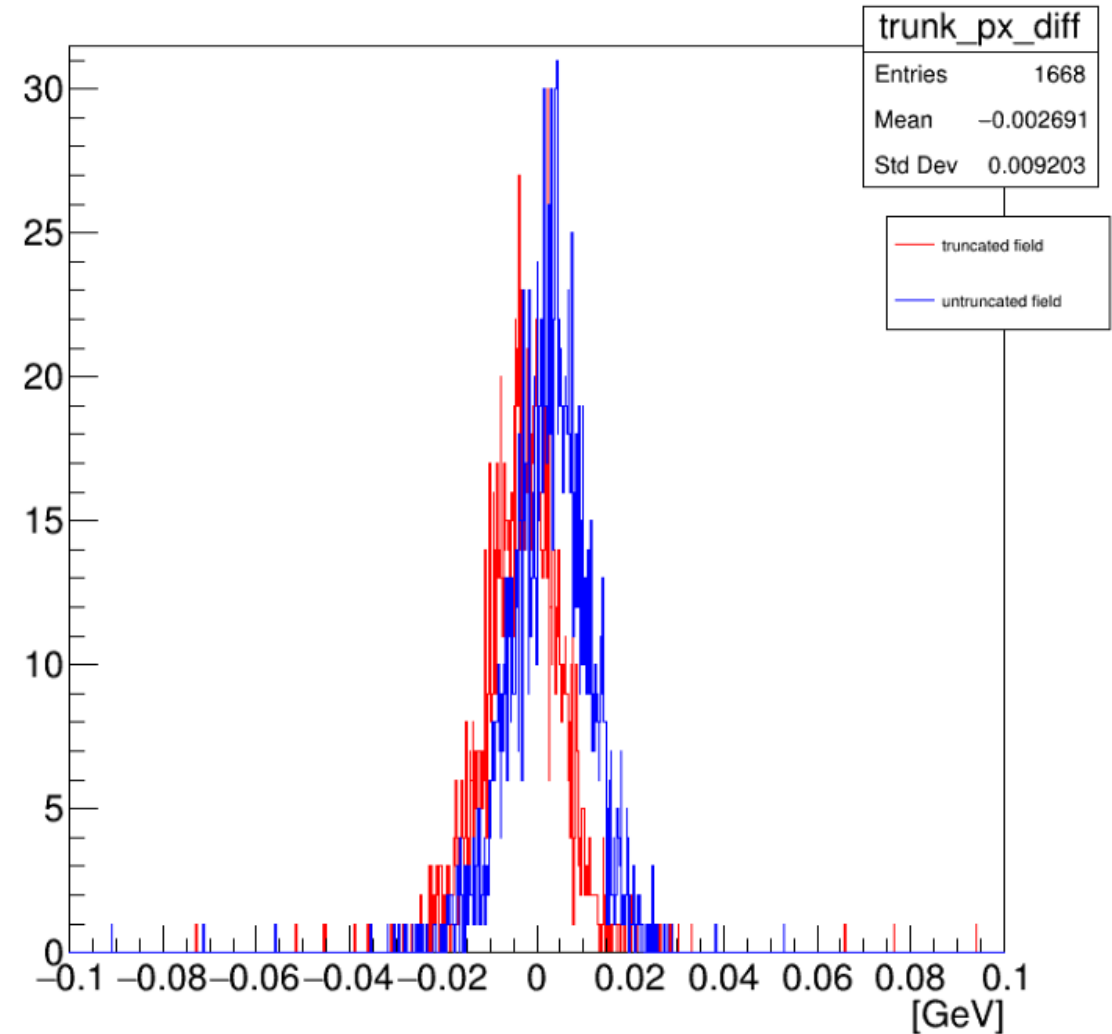
MC Y at Ecal - Track Y at Ecal



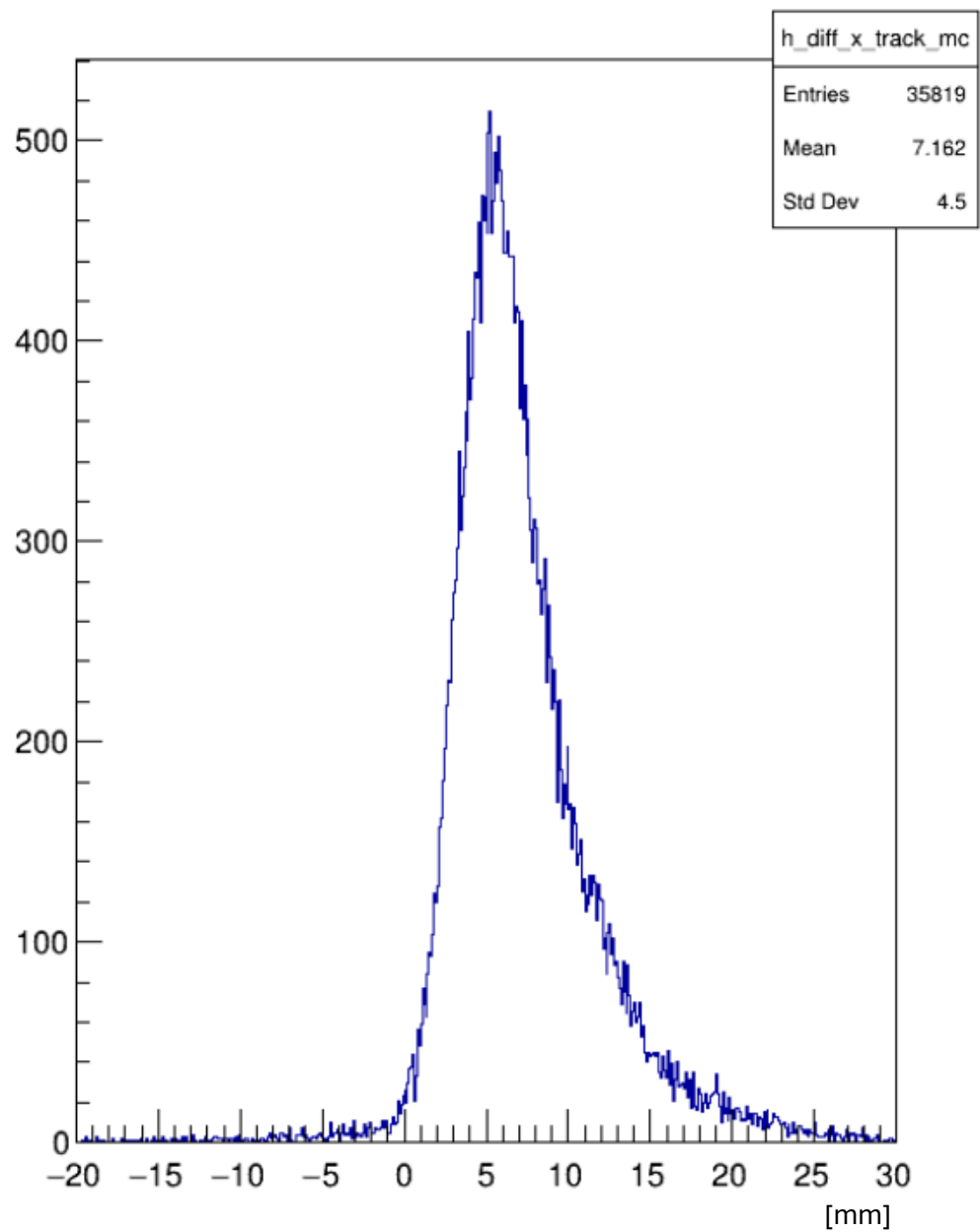
Truncated B field at SVT Layer 6

- Perhaps the discrepancy has something to do with the extrapolation algorithm from the last SVT layer to the Ecal?
- Made an identical MC sample except with a nonphysical B field that abruptly stops at SVT layer 6 to investigate

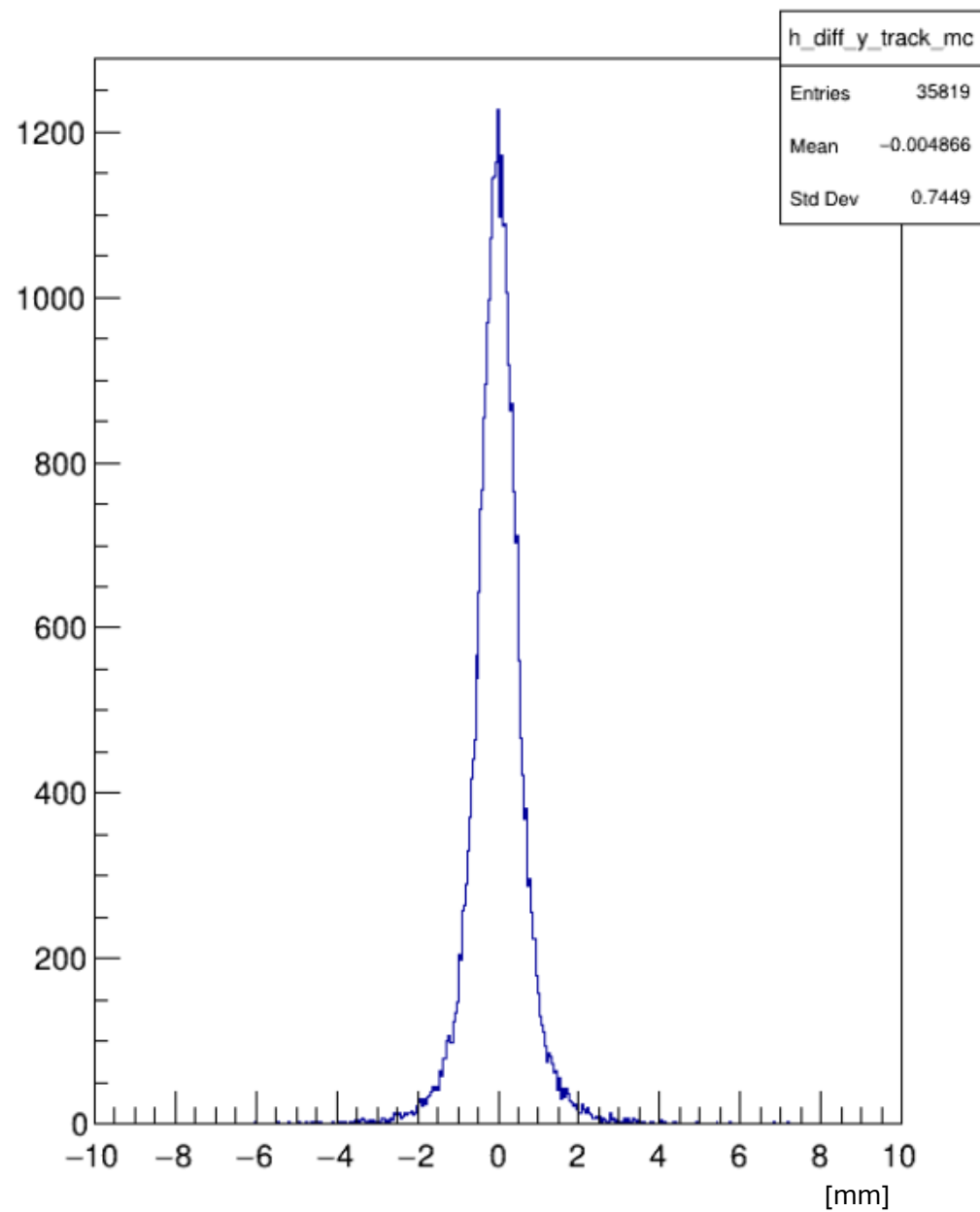
MC PX at SVT - MC PX at Ecal



MC X at Ecal - Track X at Ecal (Truncated Field)



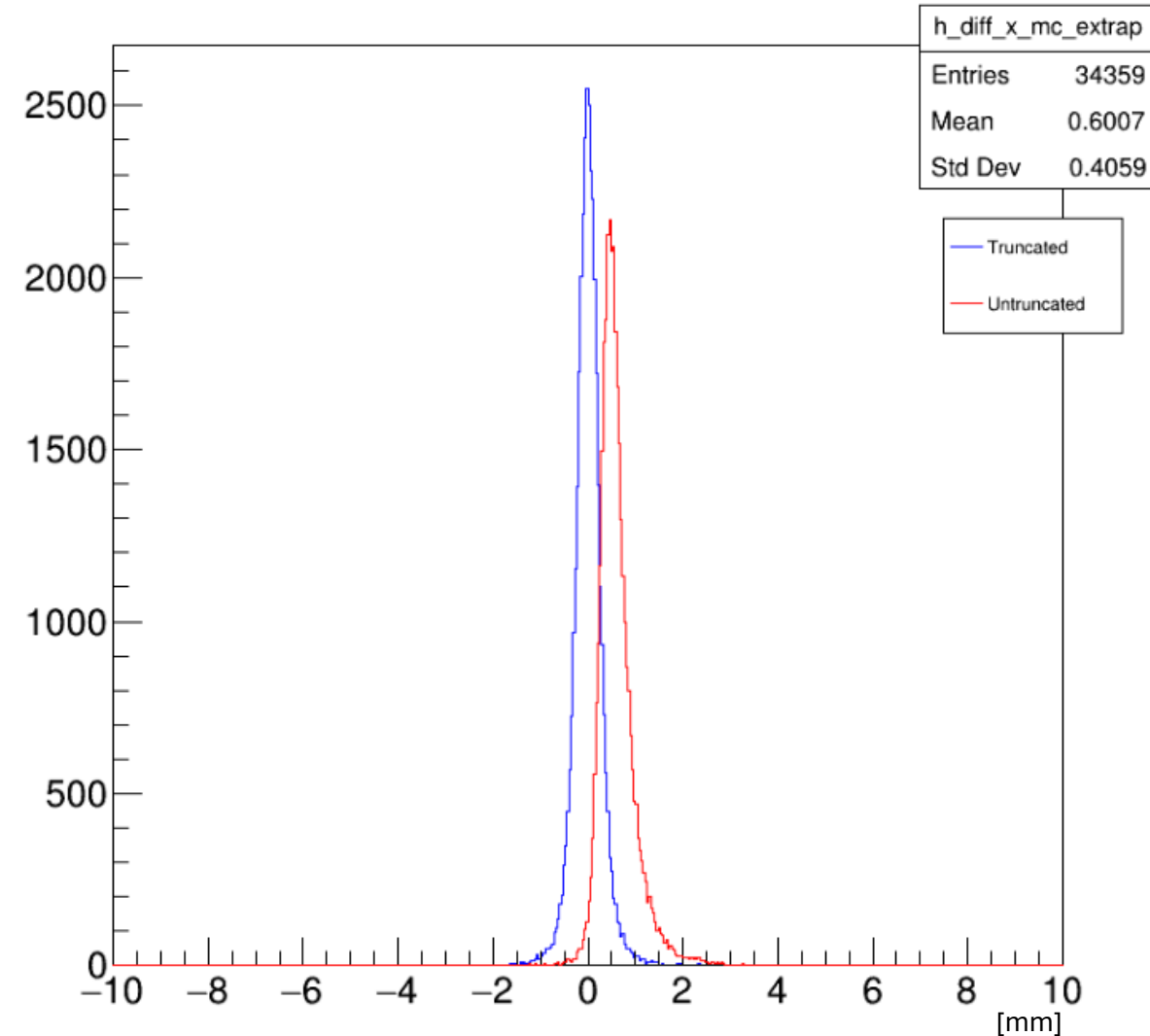
MC Y at Ecal - Track Y at Ecal (Truncated Field)

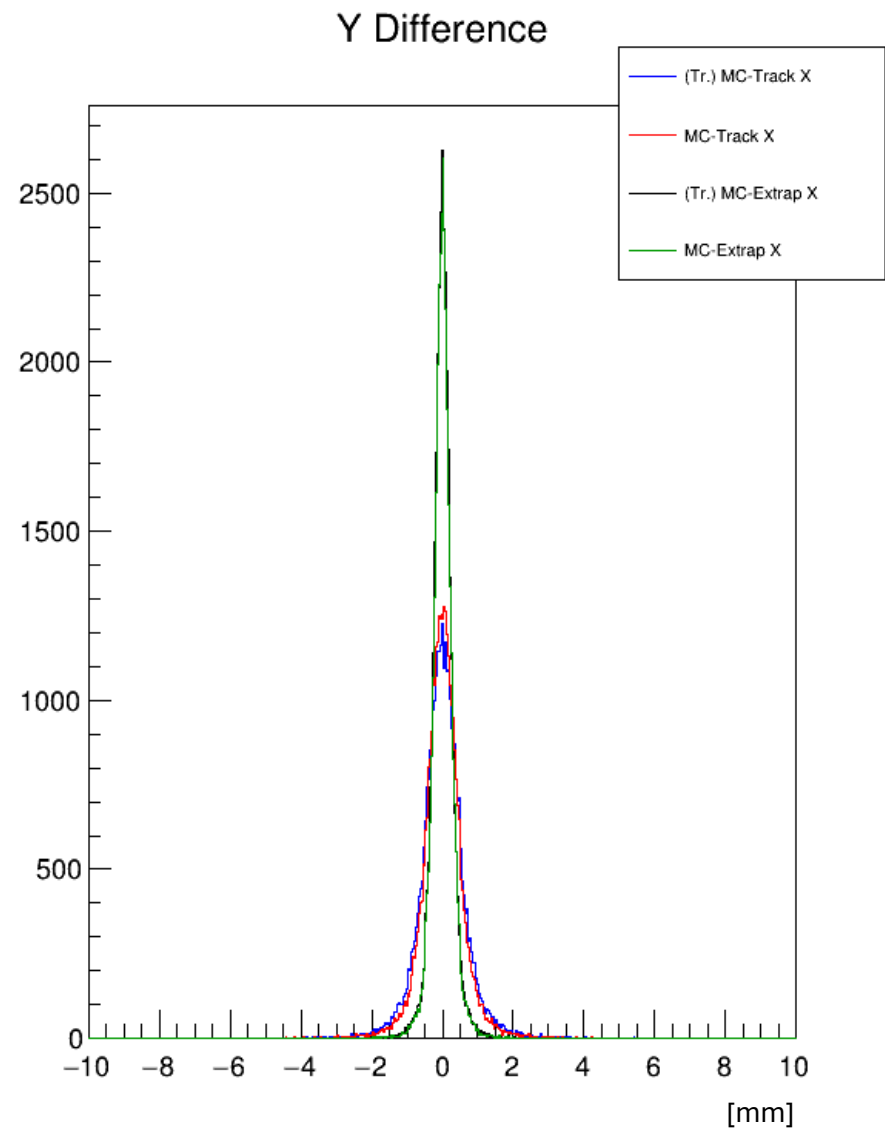
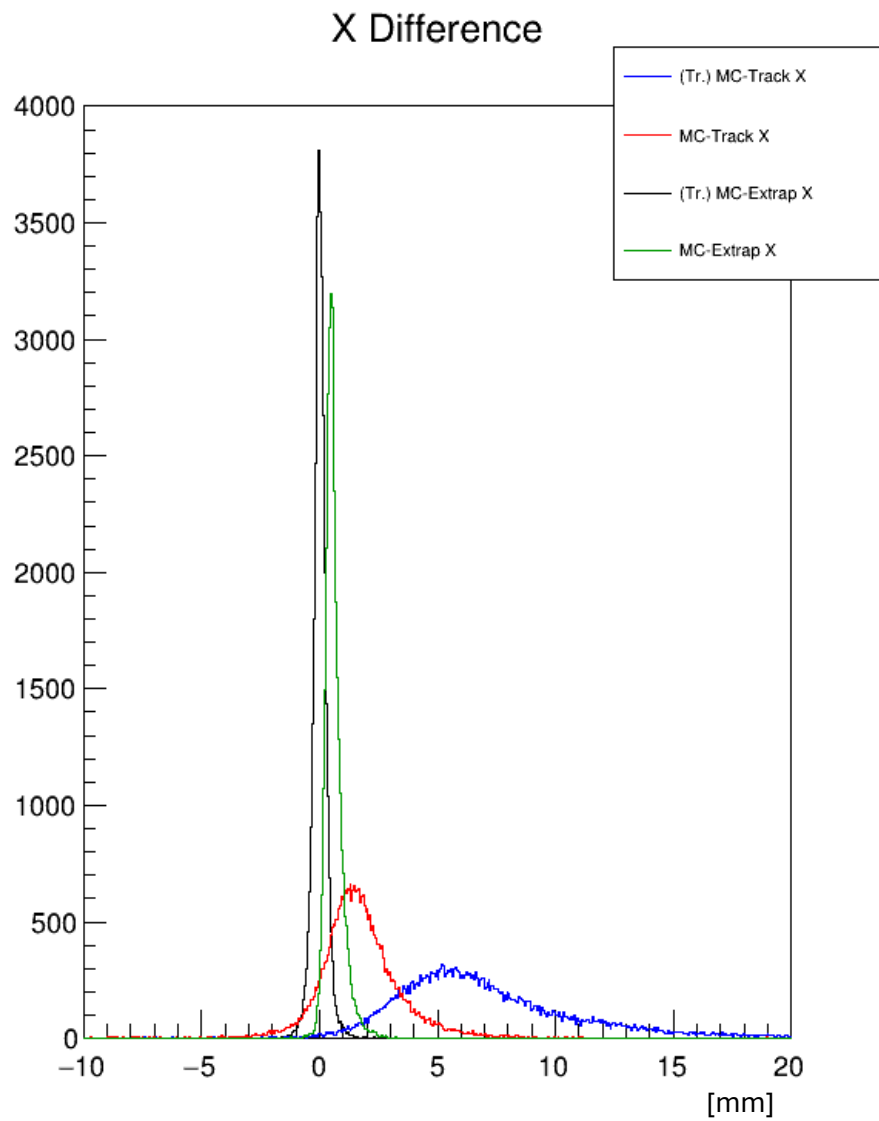


Manual Extrapolation to Ecal face

- In the MC sample with no B field between svt6 and the Ecal, the momentum vector can be easily extended
- This is a cheat: does not require the track and uses only MC truth information

MC X at ecal - X at ecal Extrapolation



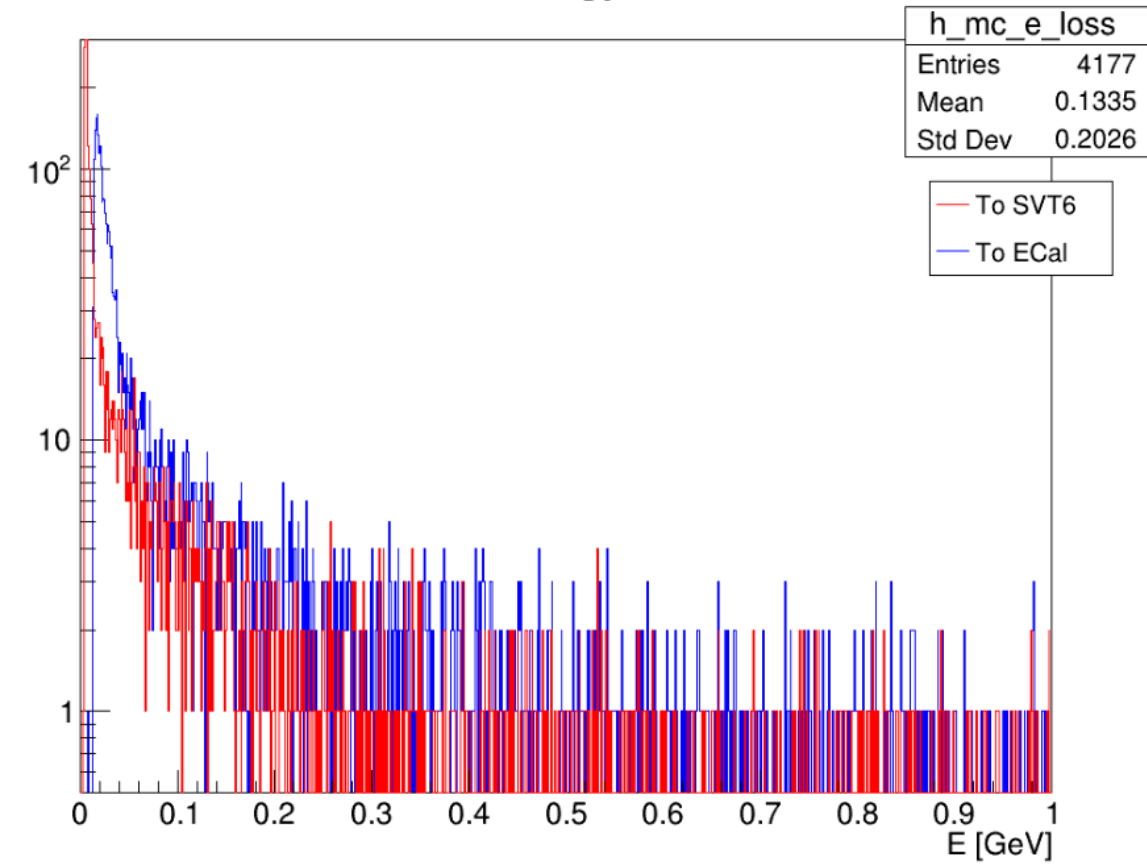


Next Steps

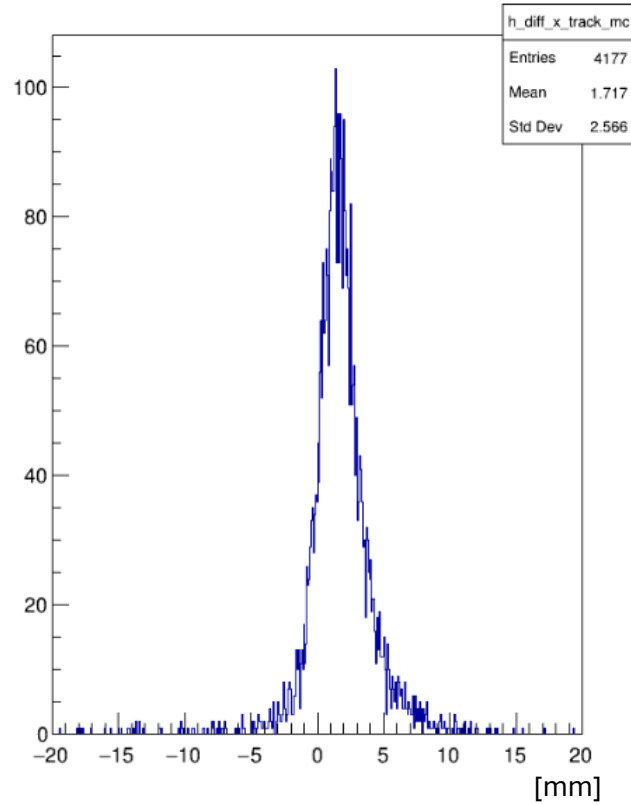
- Look at difference between mc truth data and track x at svt6 to confirm that the track is good at svt6
- Use track information at svt6 to extend the track to the ecal face using something other than HPS java

electrons

MC Energy Loss



MC X at Ecal - Track X at Ecal



MC Y at Ecal - Track Y at Ecal

