FTM simulations

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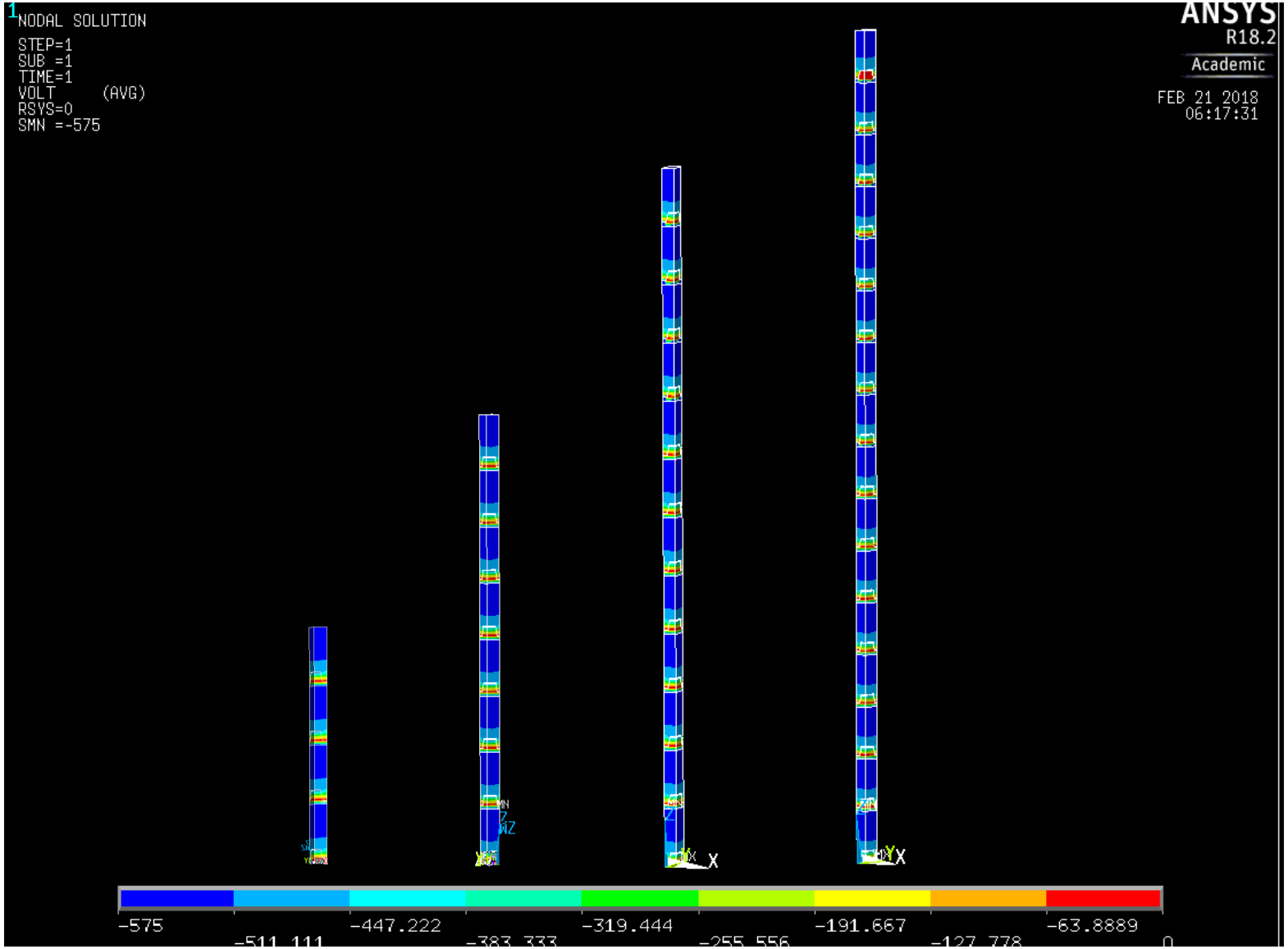
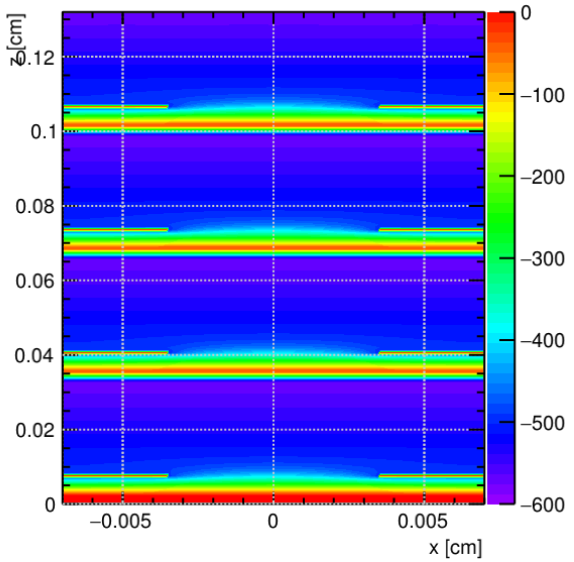
Procedure

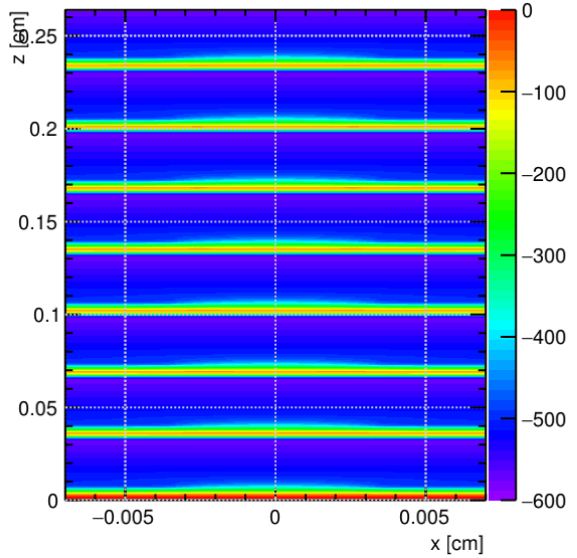
- ANSYS and Garfield++ codes fully automatic. Just needs to change nlayer.
- Analysis for 1, 4, 8, 12, 16 layers: amp field 100kV/cm, drift field 3kV/cm
- Ar/CO2 70:30, penning at 0.57
- 150 GeV/c Muon track in Garfield++ using HEED class
- For each layer, we record the gain: charge liberated, given by the total number of electrons created in the avalanche and arriving on the PCB
- For each layer, we record the time of the electron created in the avalanche and the time of arrival on PCB
- For each layer, we keep the minimum of the timing, giving the resolution the detector

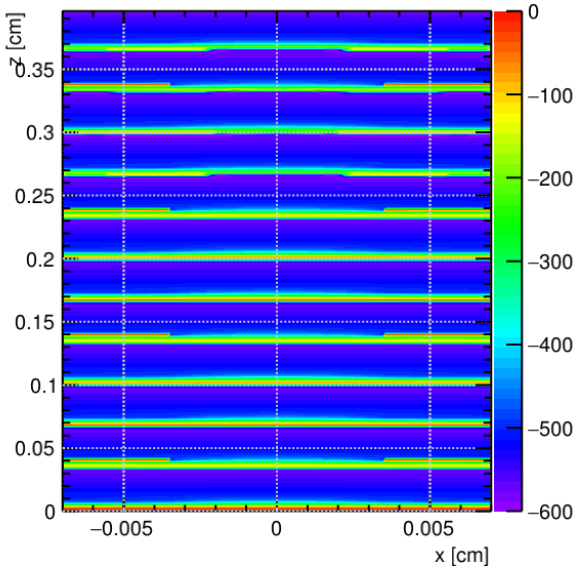


4 layers 8 layers 12 layers 16 layers

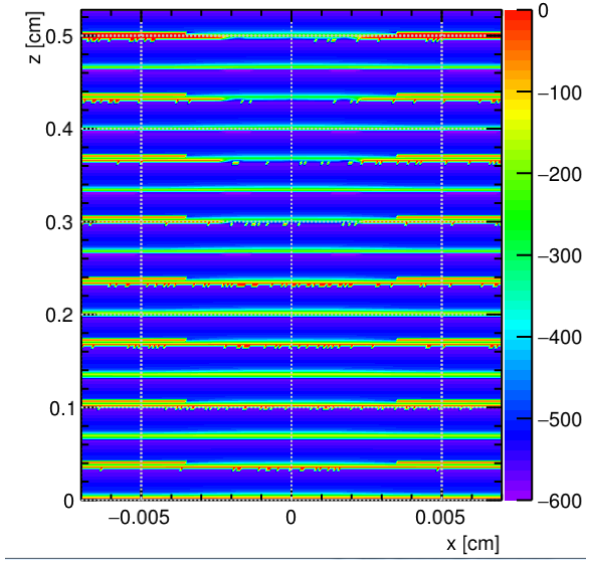
ANSYS

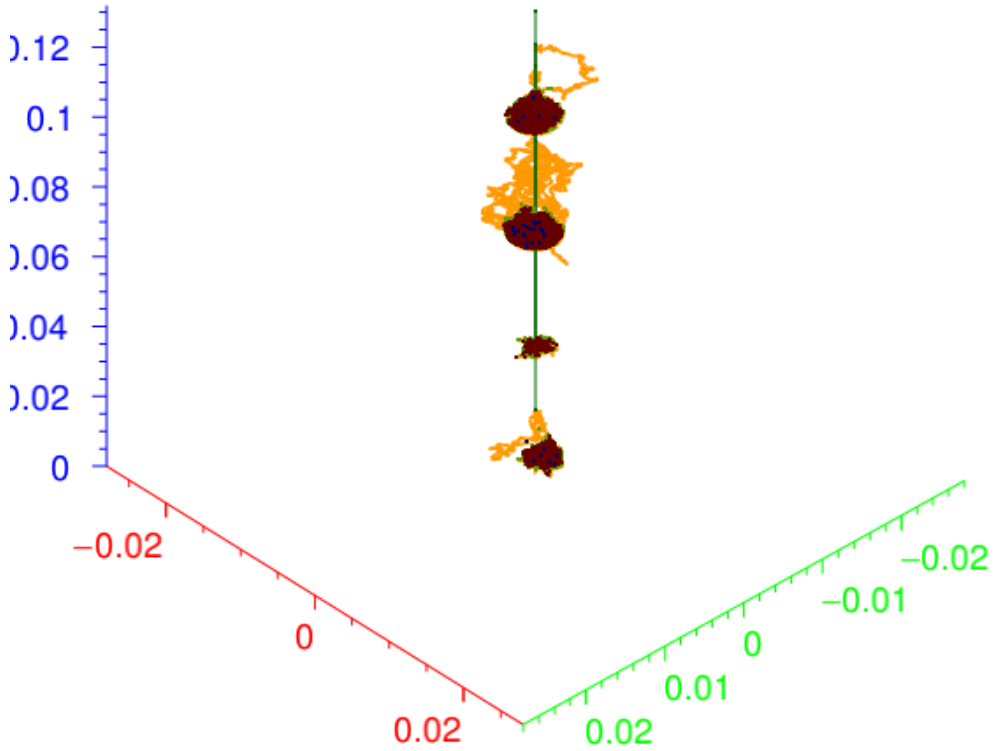


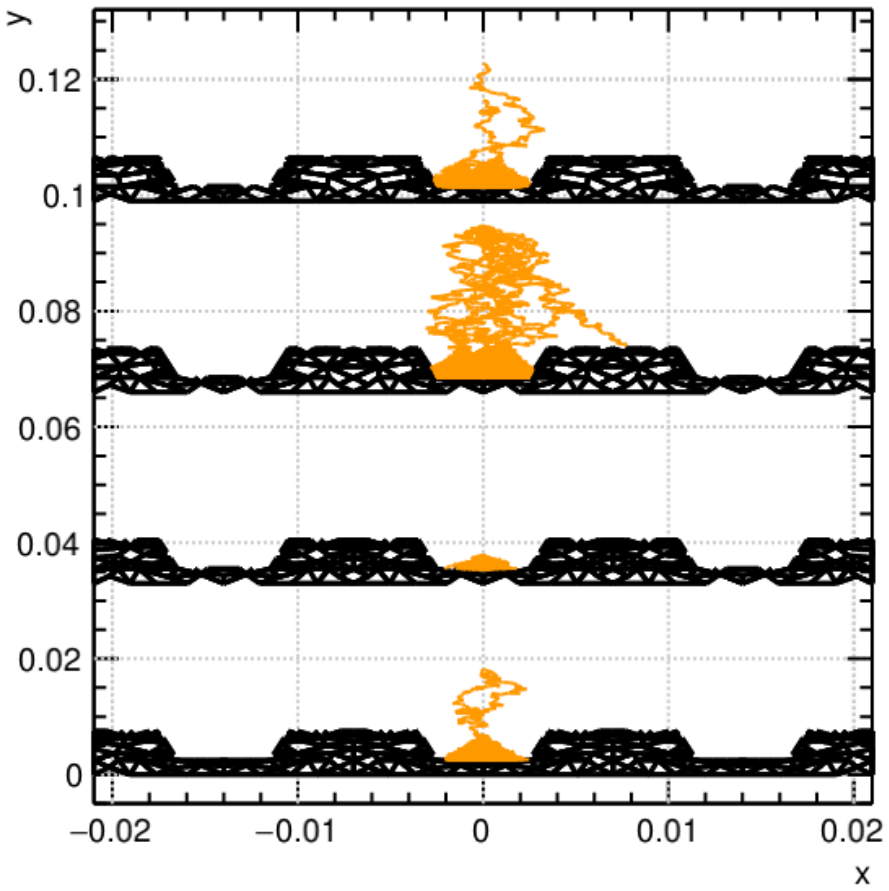




Garfield++ Field View

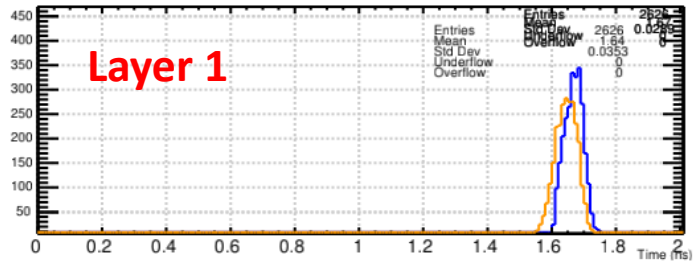


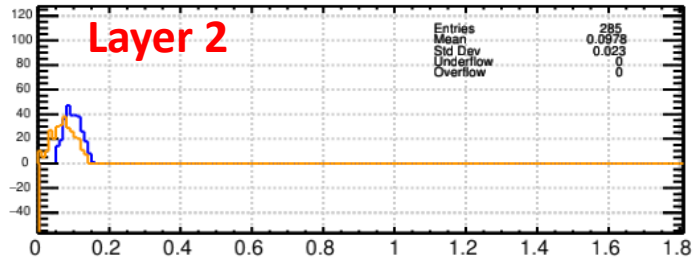


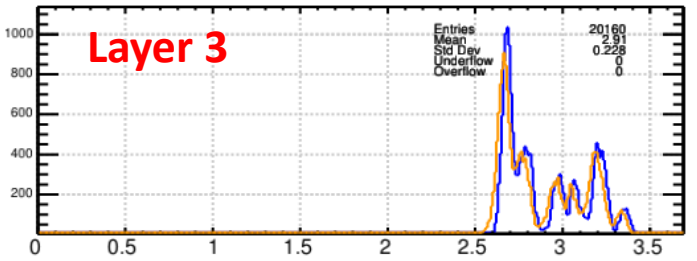


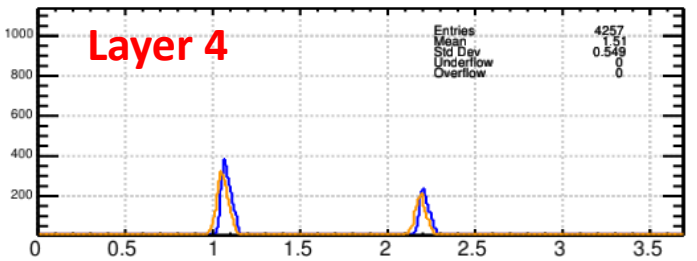
150 GeV/c muon in 4-layer FTM

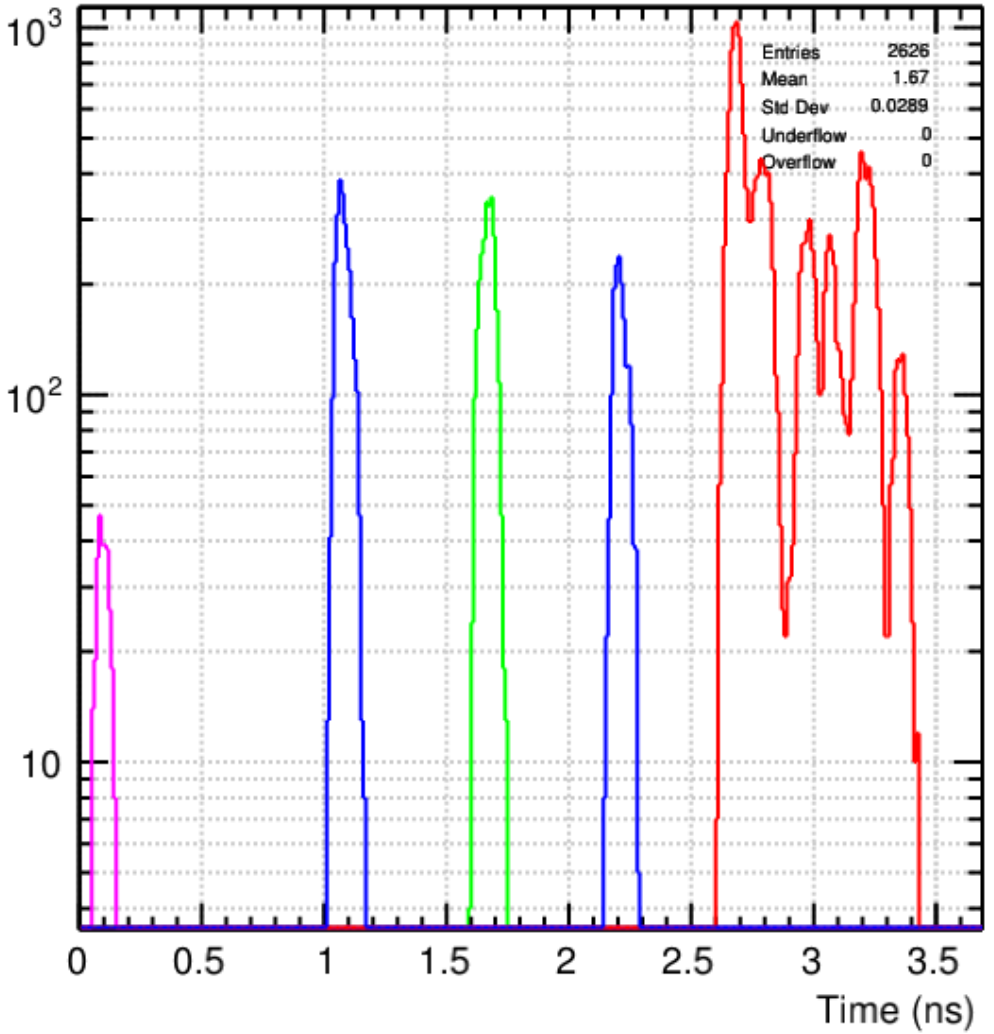
Timing histograms in 4 layers





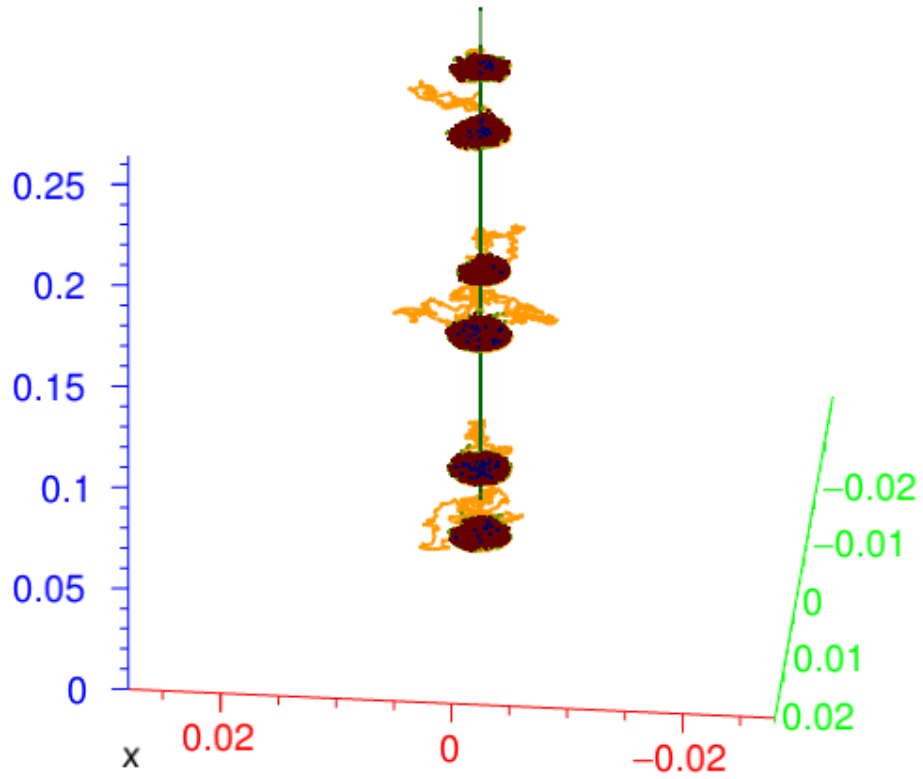


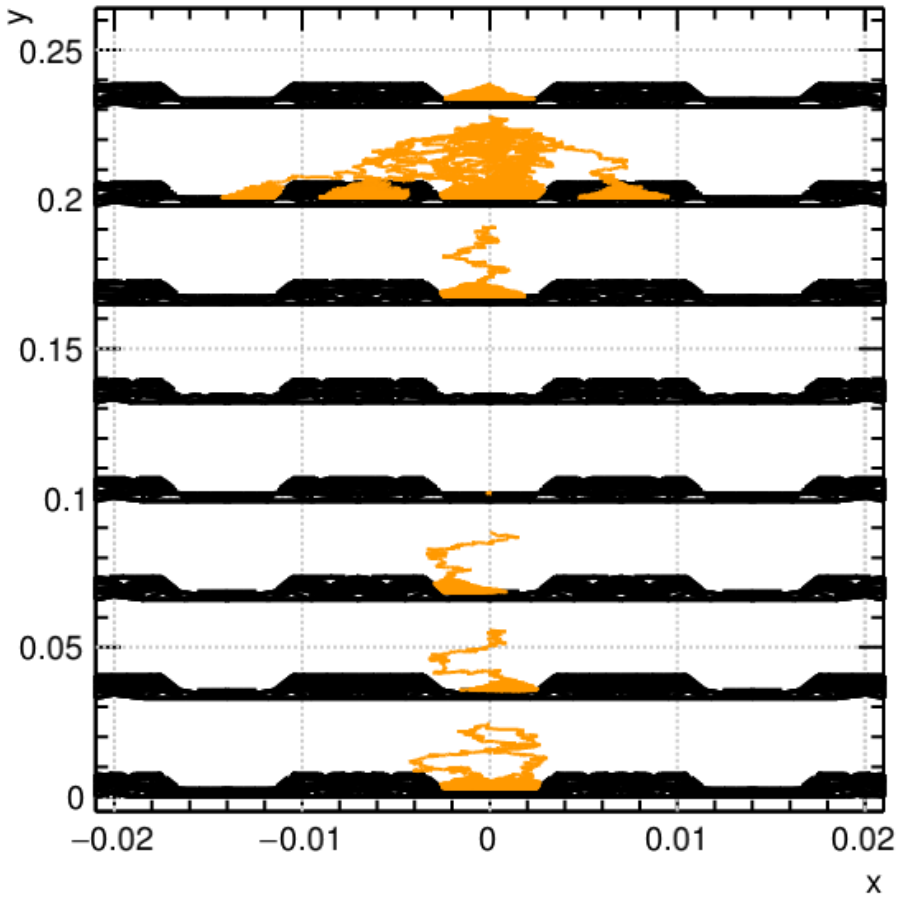




Orange: Amplification time, Blue: endpoint time

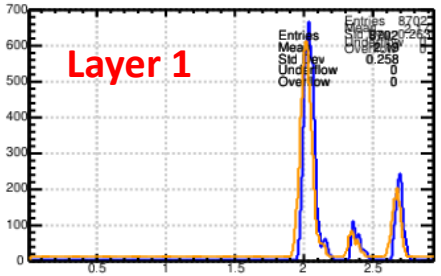
All 4 layers together

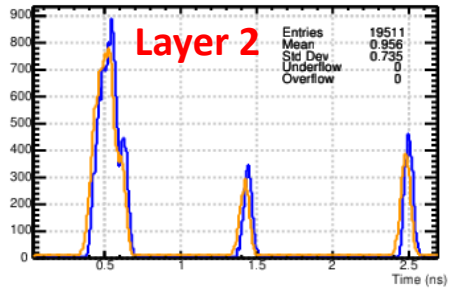


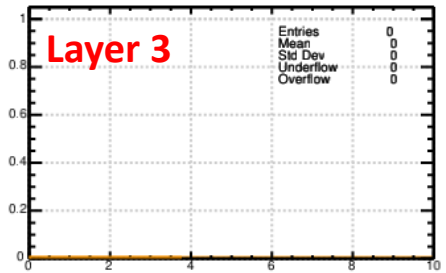


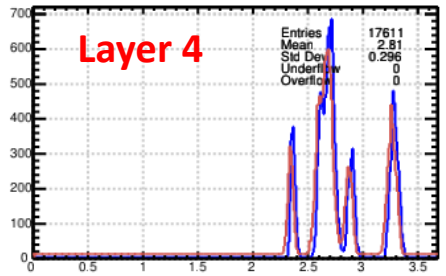
150 GeV/c muon in 8-layer FTM

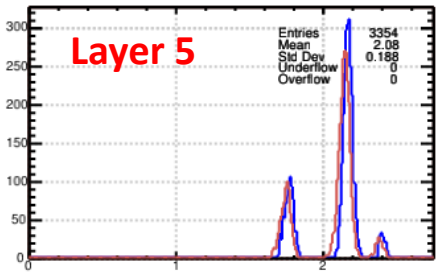
Timing histograms in 8 layers

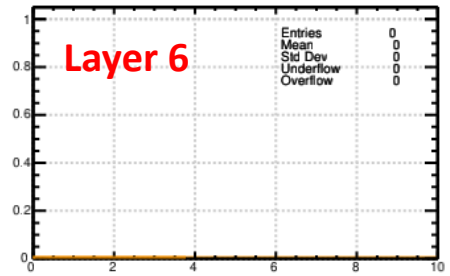


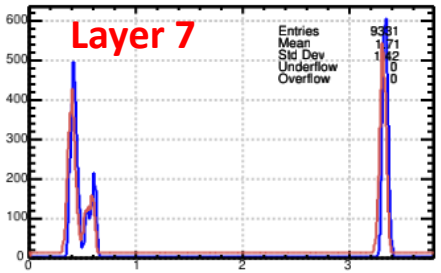


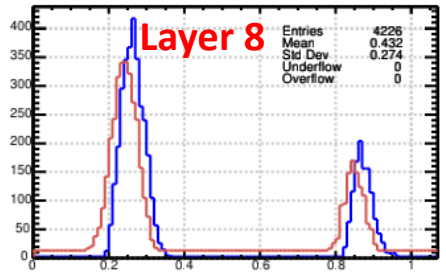












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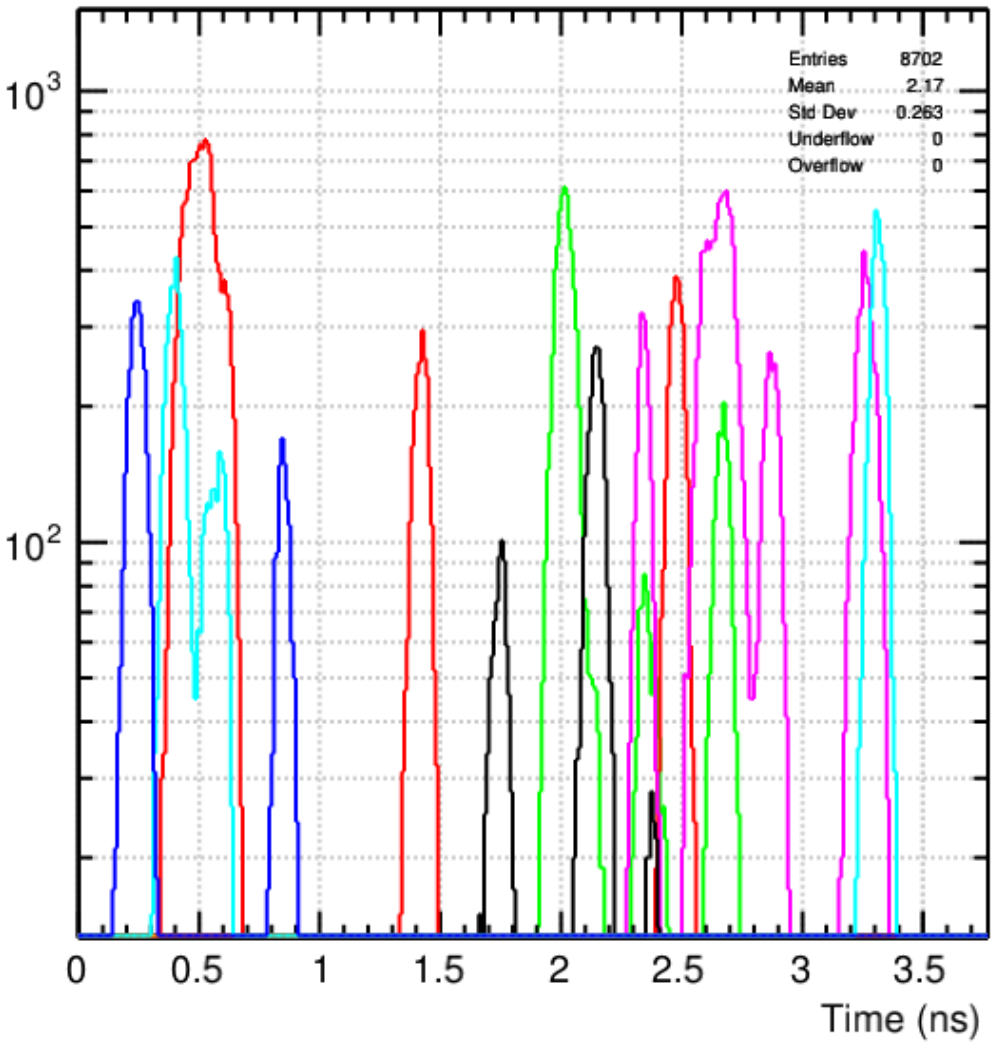
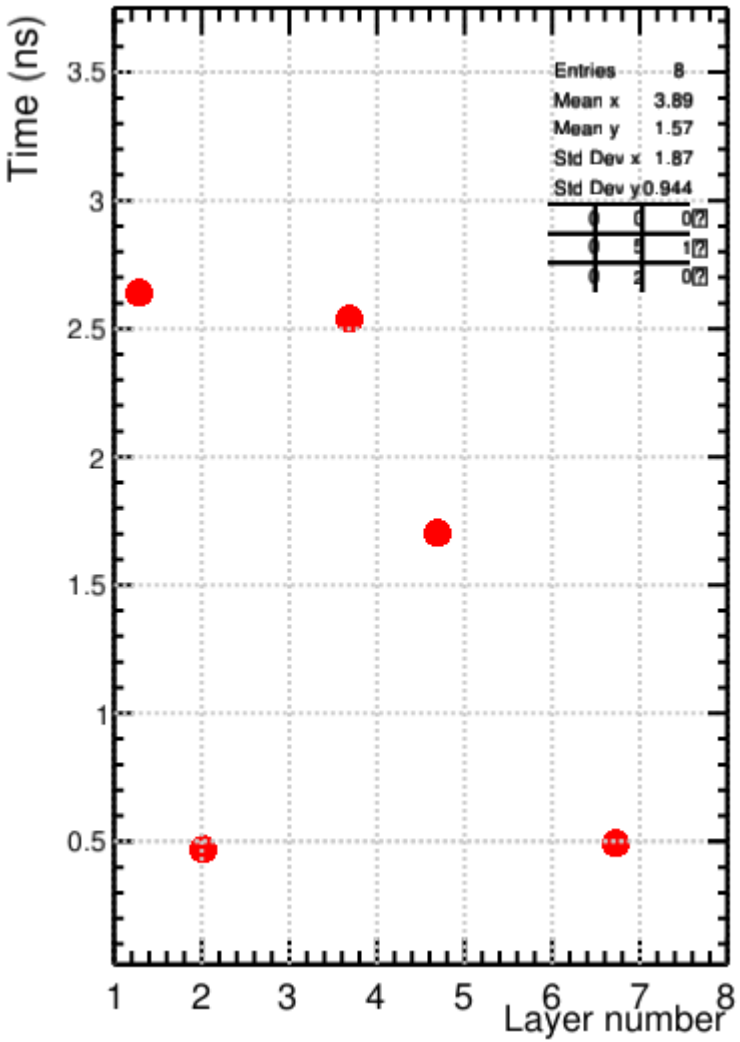


All layers together



Summary

- Example of time resolution for 8-layer FTM (~ **450 ps**)
- The mean value of each layer from the previous histograms is kept
- Entire Procedure is to be verified
- Gain (using track or electron? Total number?)
- 12 layers and 16 layers seems to have small problem with voltage
- Next steps?