



GARFIELD++ & LTSpice simulation

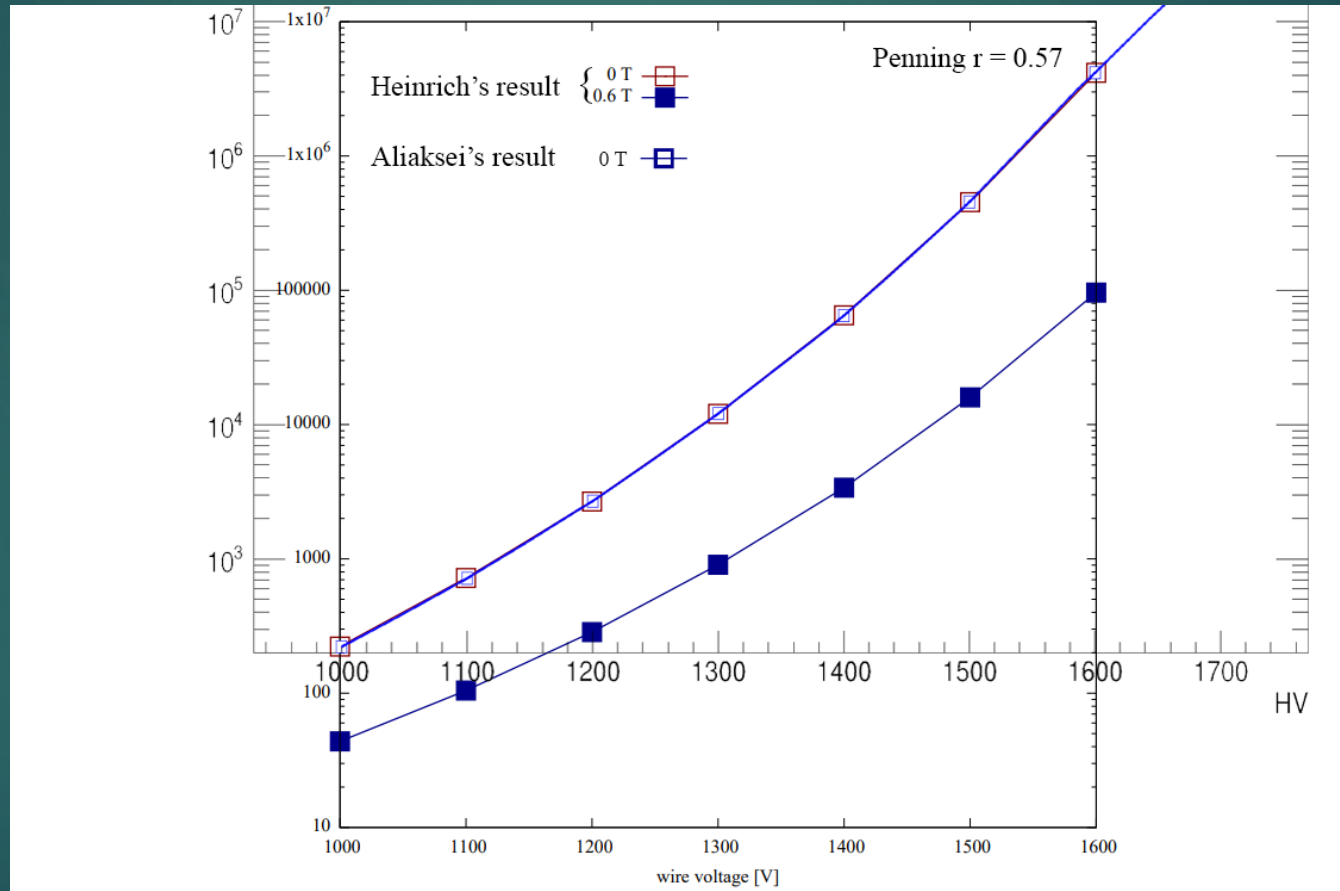
Aliaksei Paulau (JINR)
Assel Mukhamejanova (JINR)

Main questions

	Issue	Status	Description
01	Gas Gain	Not fixed	After discussion with Garfield & Garfield++ devs. Heinrich sent a source C++ file with RKF Gas gain modeling. My results matched Heinrich's, but still the gas gain is different from ATLAS TRT.
02	Signal different between visualization and data output	Not fixed	Difference between signal amplitude in inner class and output data
03	Difference between signal output after LTSpice simulation	in progress	The difference between the amplitudes of Aliaksei (1.5 mm point) and Assel (1 & 2 mm points), after LTSpice processing. Additional point generated by me (2 mm) -> the results matched with Assel.
04	Comparing drift path/time distributions	almost completed	Answer the question why the sigma of time is practically independent of the presence of a magnetic field. Need to update for 1.5 T magnetic field.
05	TDR plots update	done	Update pictures for the arrival time of the first and second clusters at the anode. GARFIELD & GARFIELD++.

Gas gain problem

Cross check with Heinrich's results



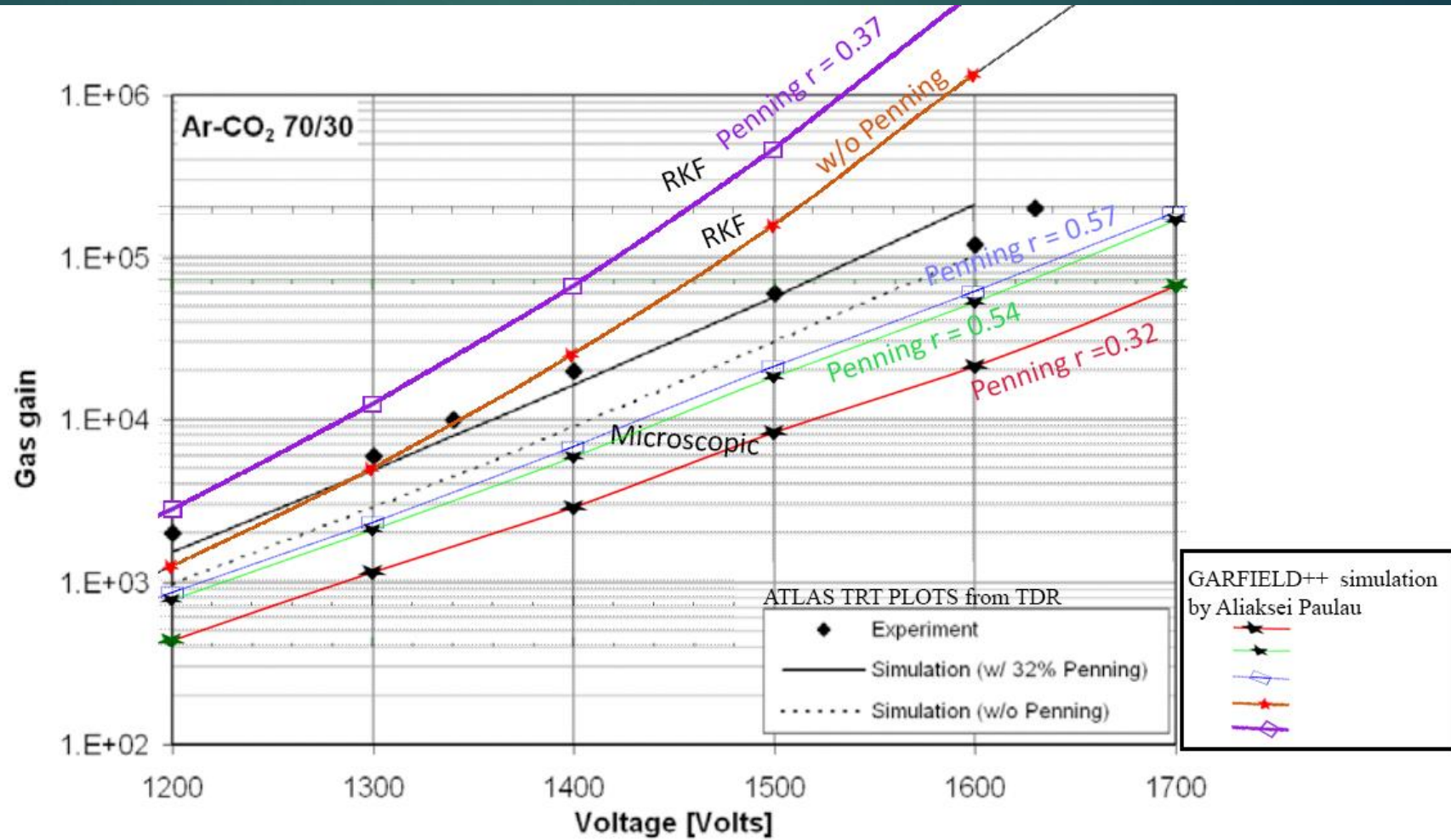
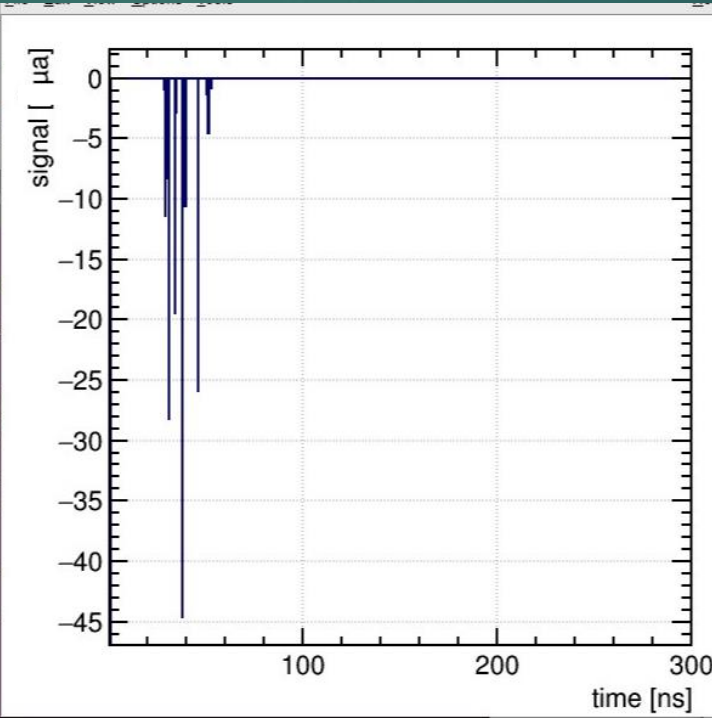
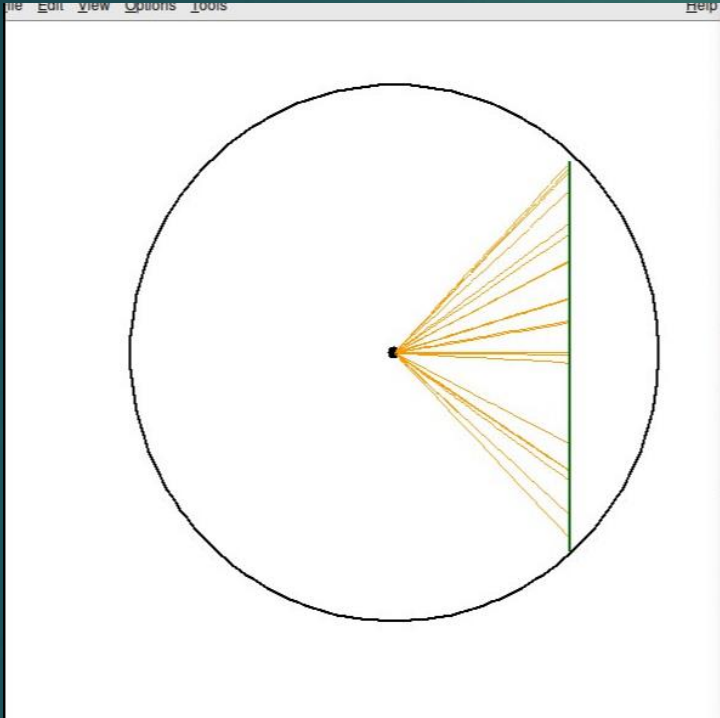
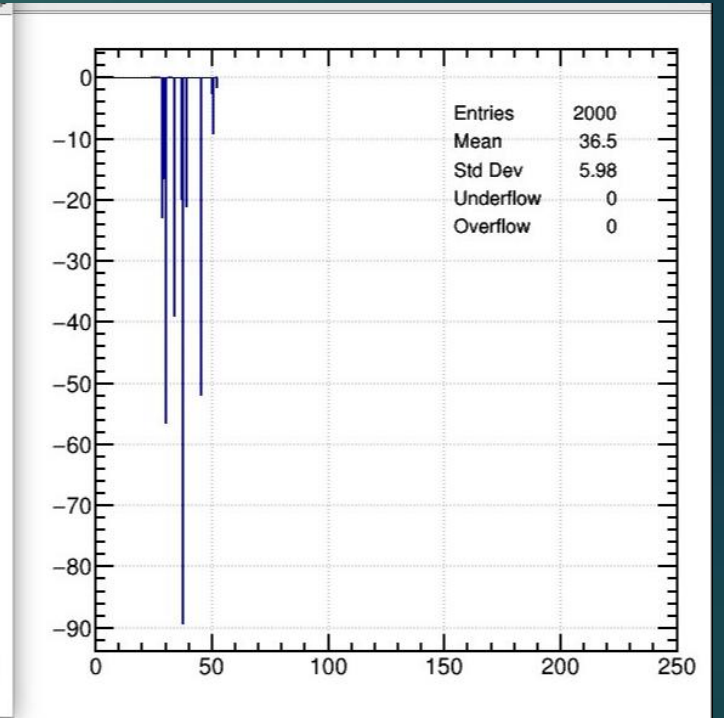


Figure 4-21 Gas gain in Ar/CO₂ 70/30 (experimental data and simulation).

0 Signal difference between visualization and 2 data output



Visualization data from GARFIELD++



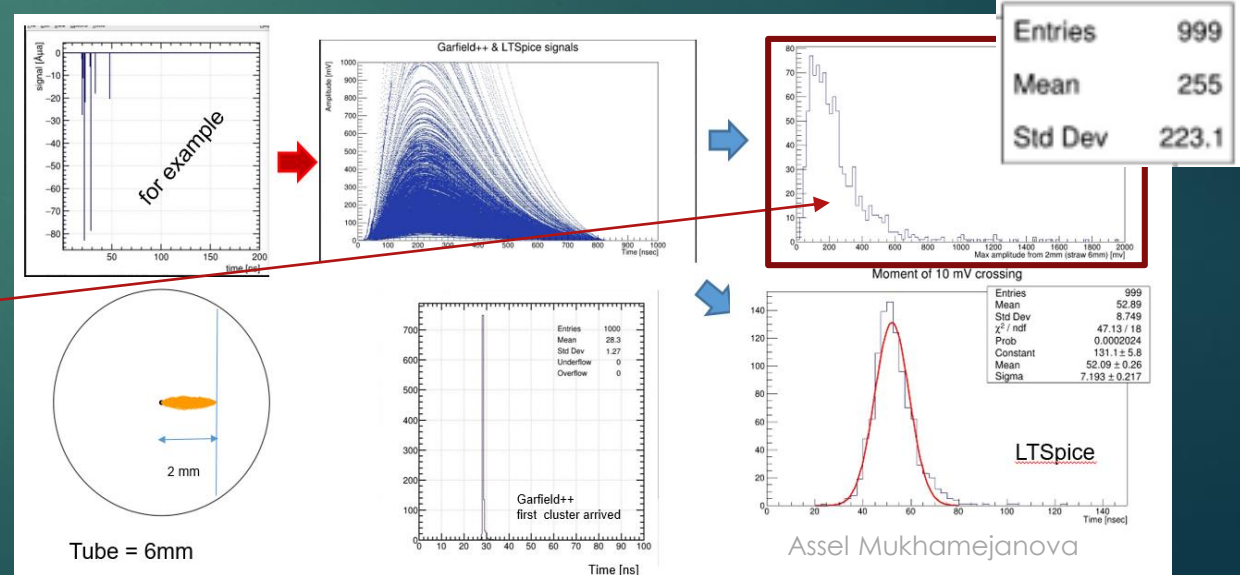
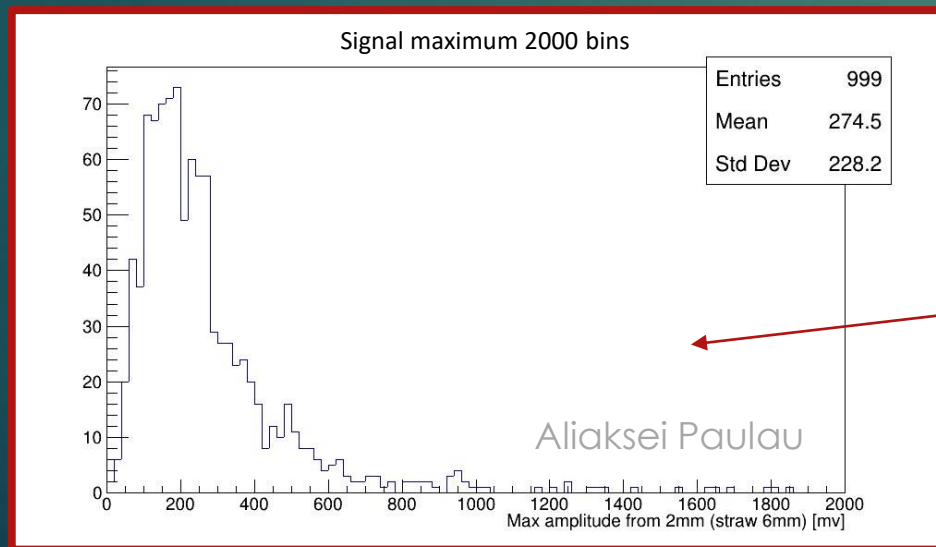
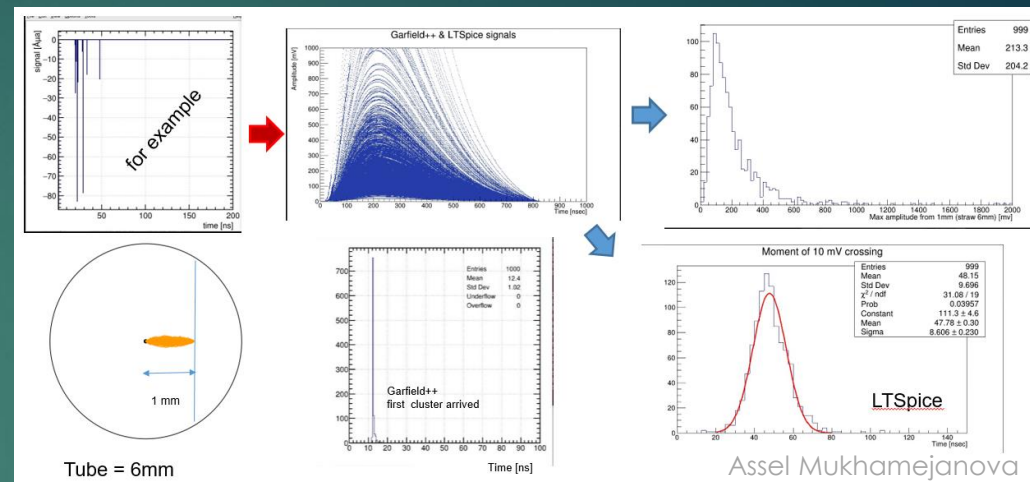
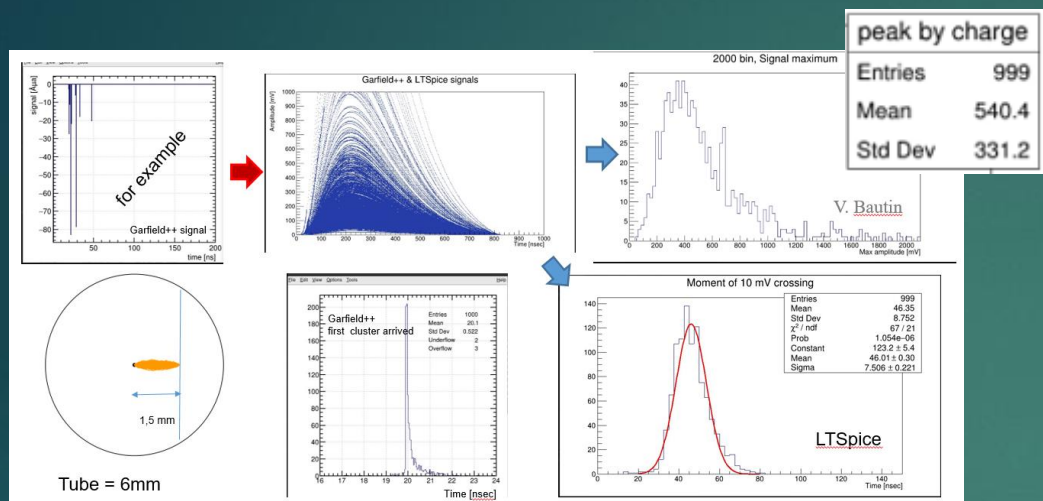
OUTPUT data from GARFIELD++



Not solved, need to think about it

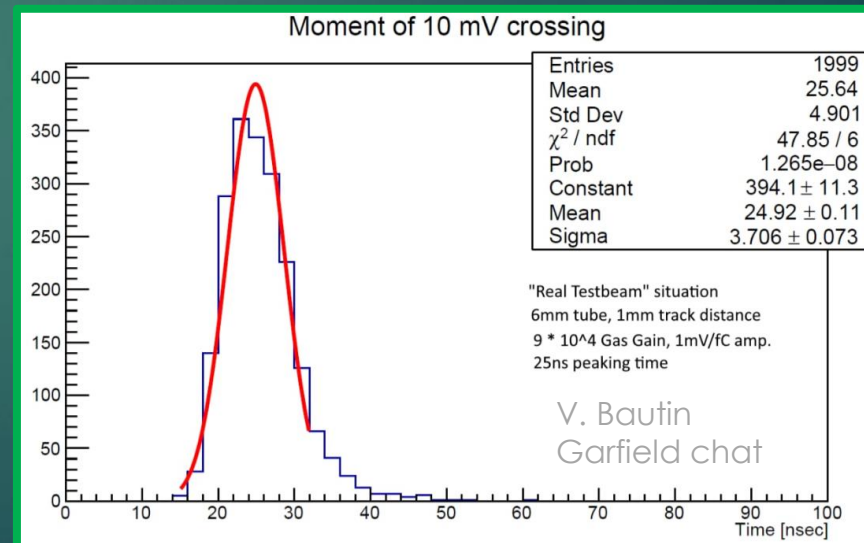
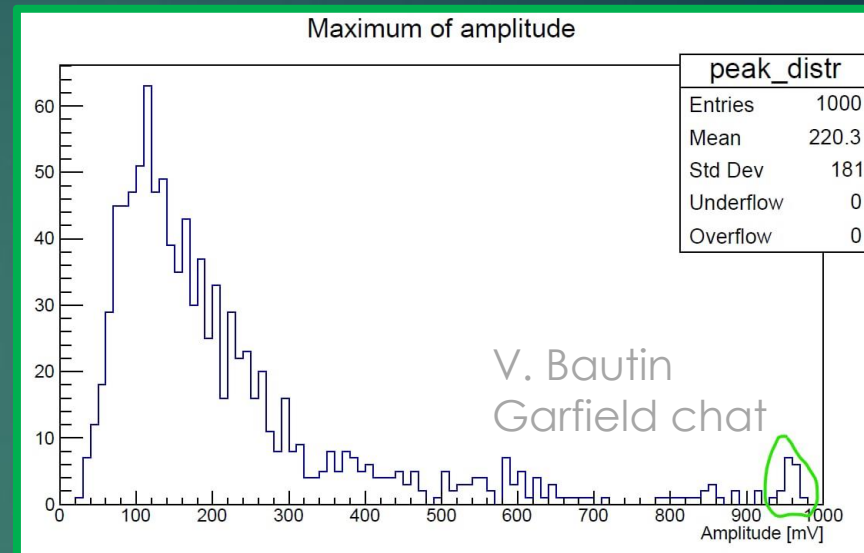
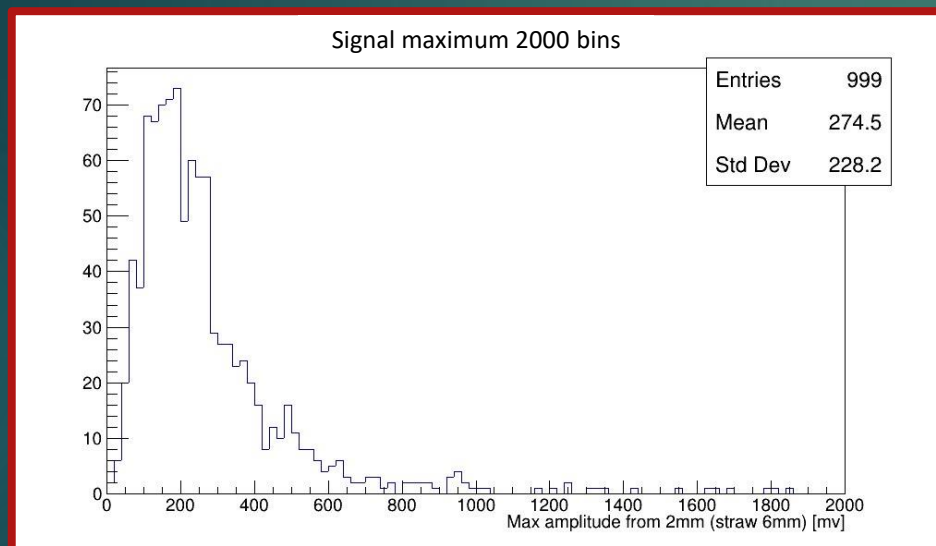
03 Difference between signal output Aliaksei and Assel, after LTSpice simulation

Garfield++ & LTSpice



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Garfield++ & LTSpice

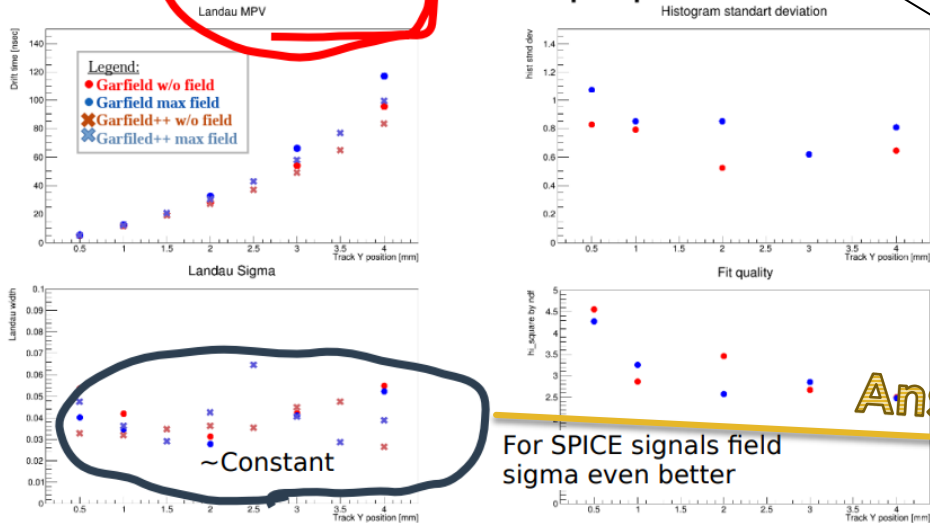


0 Comparing drift path/time
4 distributions

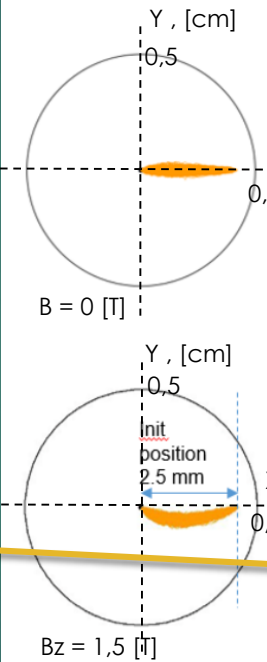
Magnetic field problem

Sergey's slide

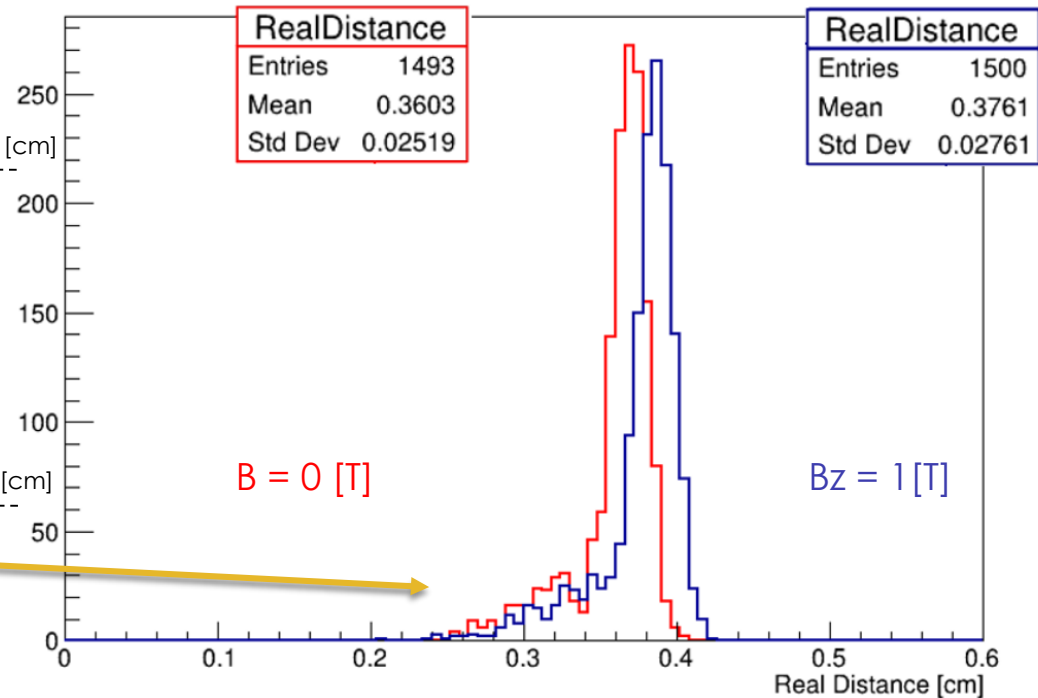
First cluster arrival properties



Drift line distribution



Drift distance [cm] from initial position 0.25[cm]



Need to update for 1.5 [T]

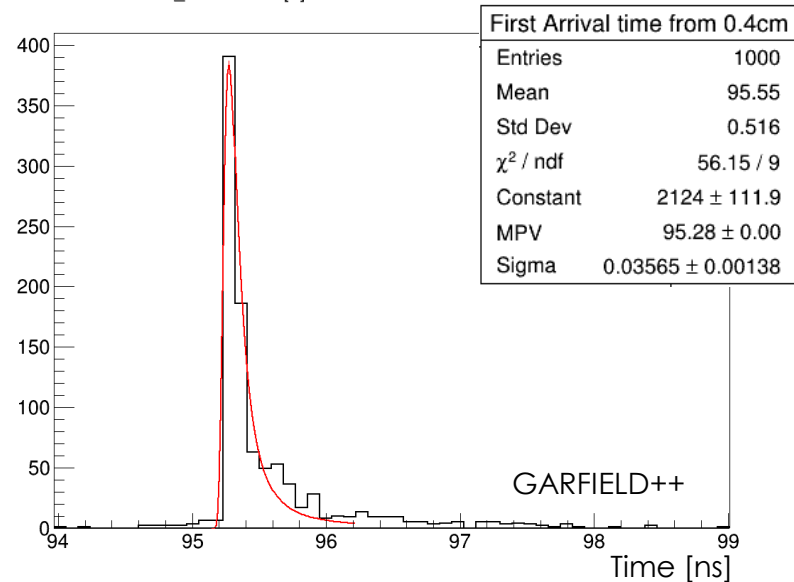


Что-то умное дописать...

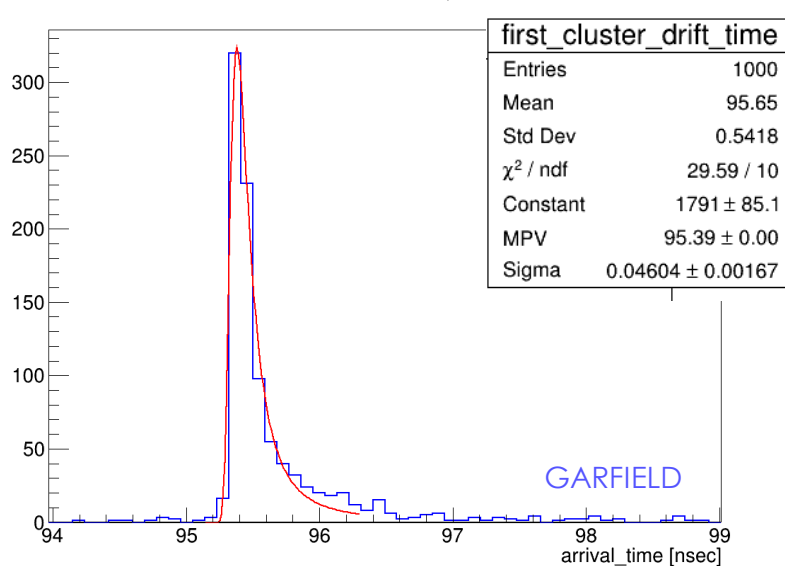
0 5 TDR plots update

First cluster arrived Bz= 0 [T].
Garfield & Garfield++ plots.
straw d = 10 [mm], radius track = 4[mm]

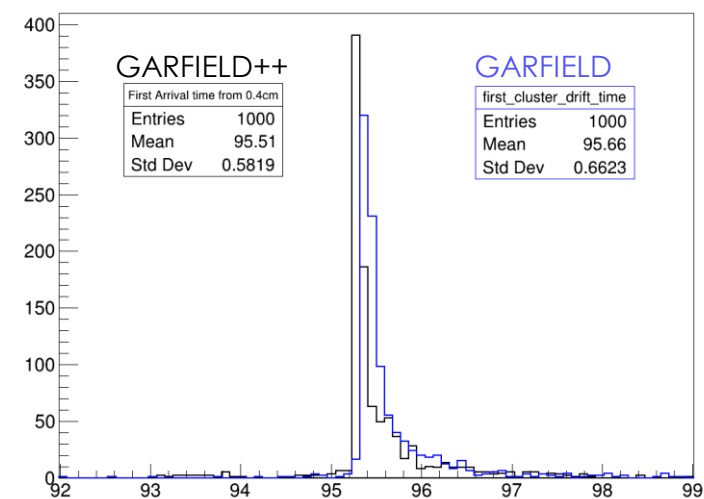
ArCo2_7030 Bz=0 [T] First cluster arrived on anode from 0.4 [cm]



first cluster drift time, zero field

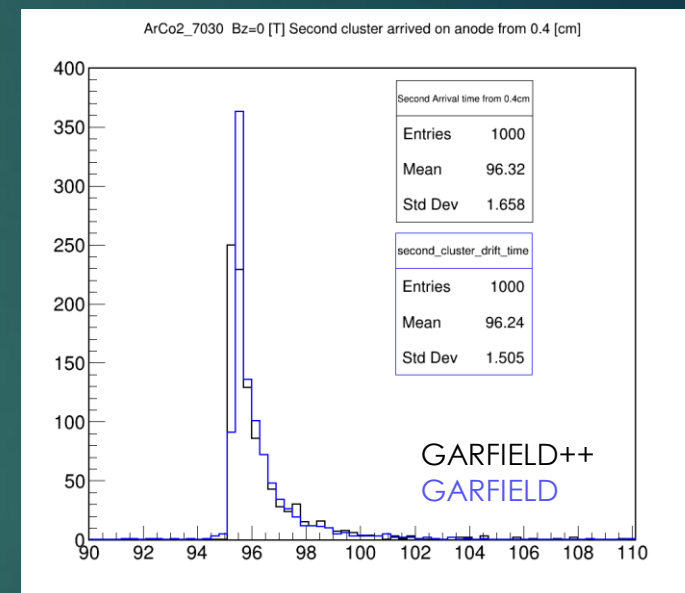
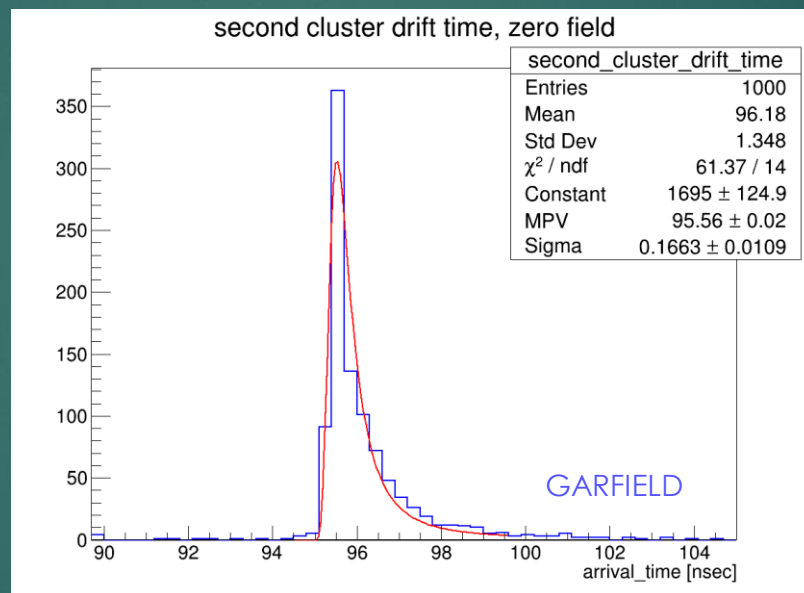
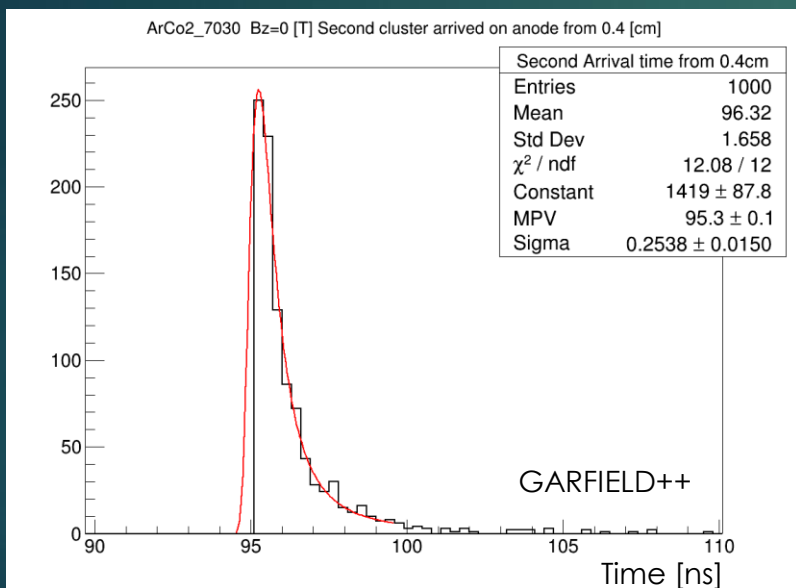


ArCo2_7030 Bz=0 [T] First cluster arrived on anode from 0.4 [cm]



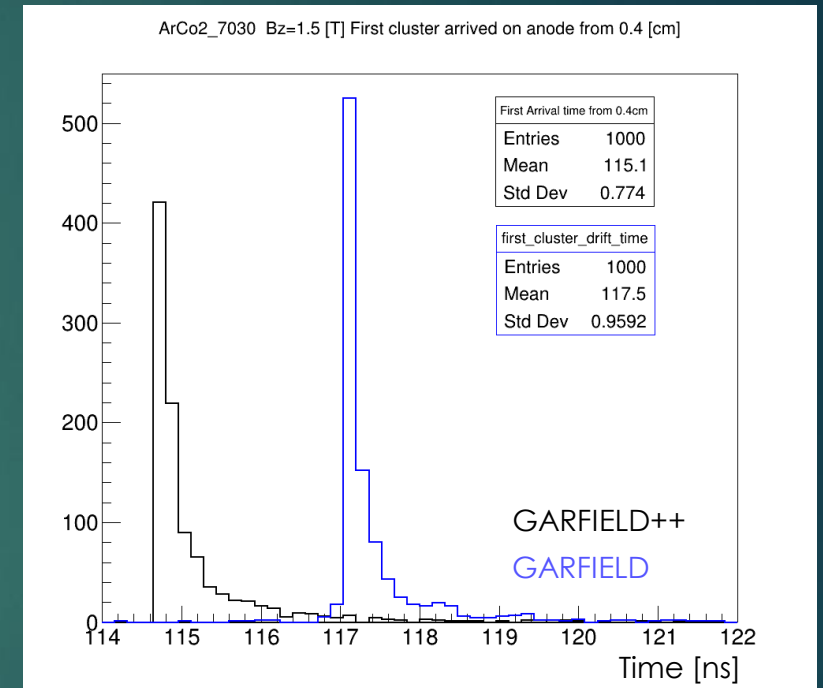
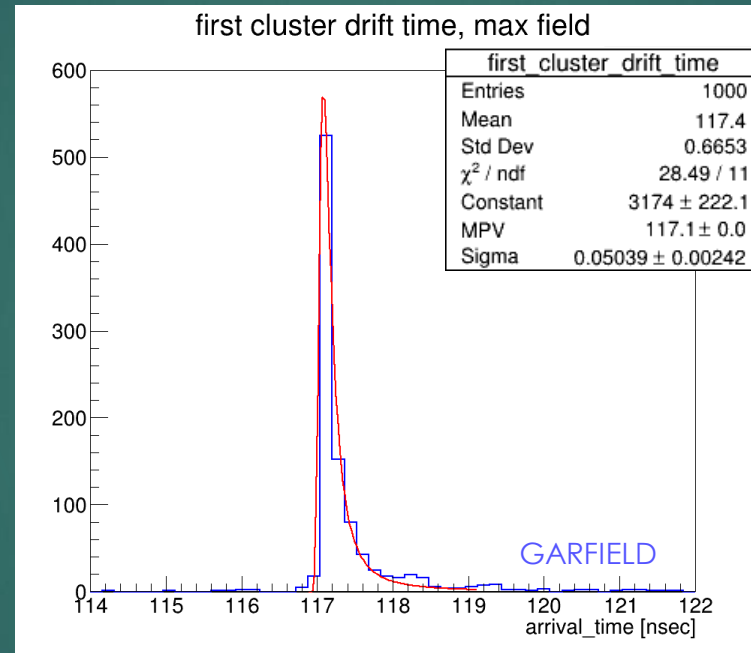
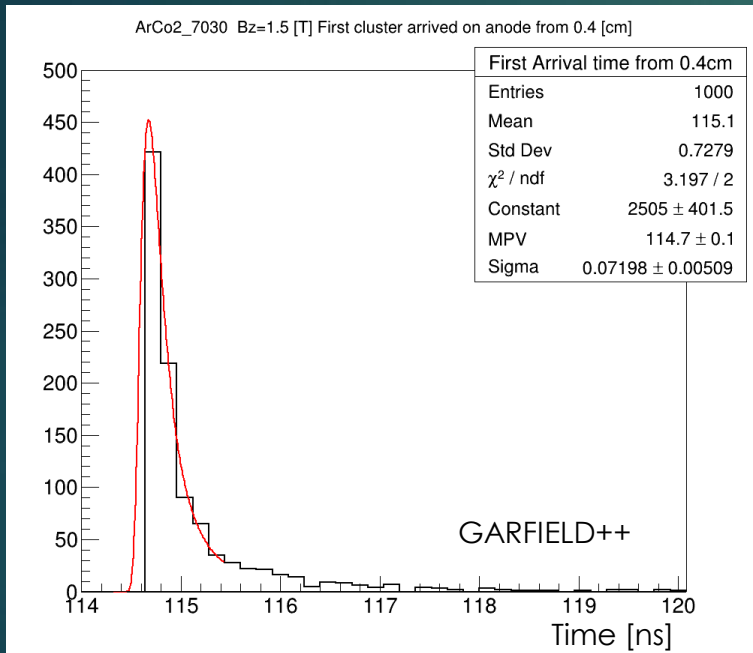
0 5 TDR plots update

Second cluster arrived Bz= 0 [T].
Garfield & Garfield++ plots.
straw d = 10 [mm], radius track = 4[mm]



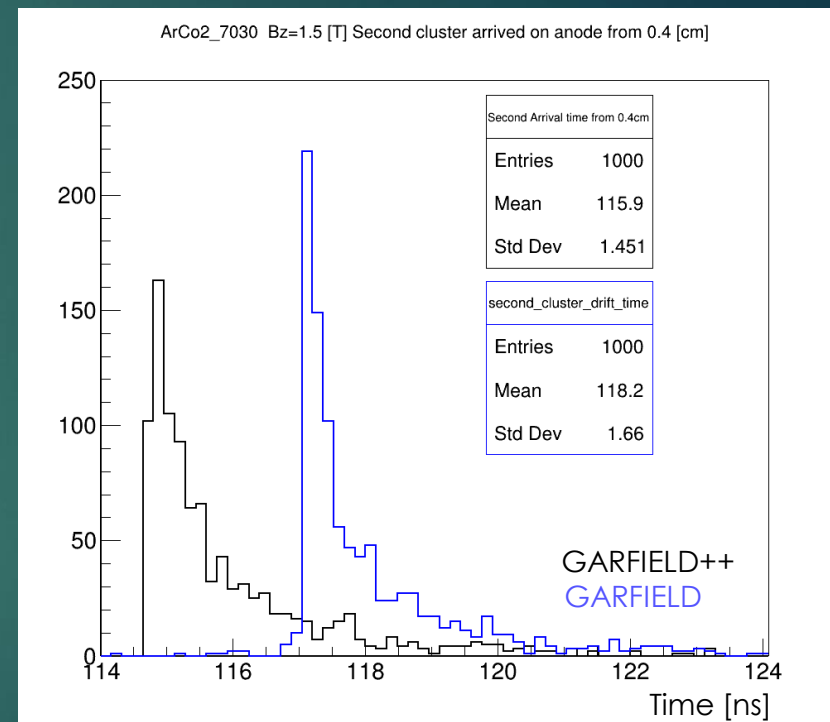
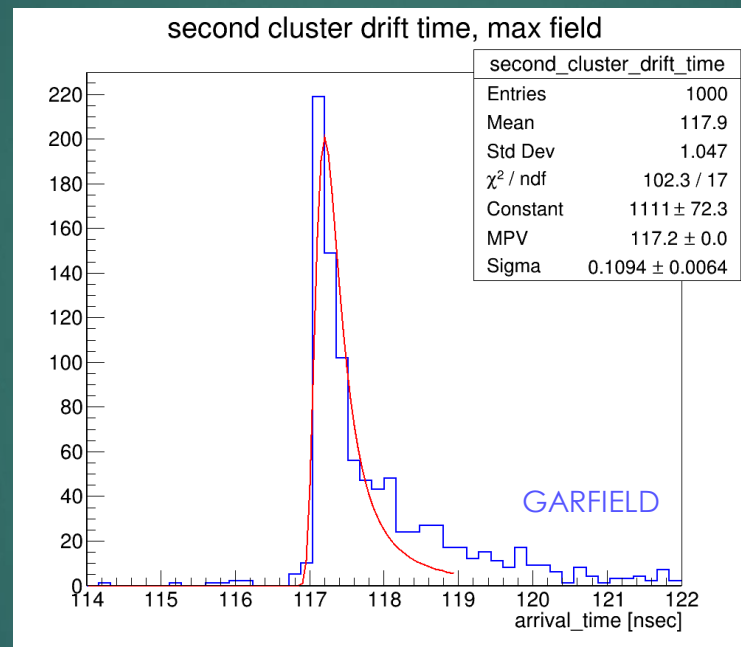
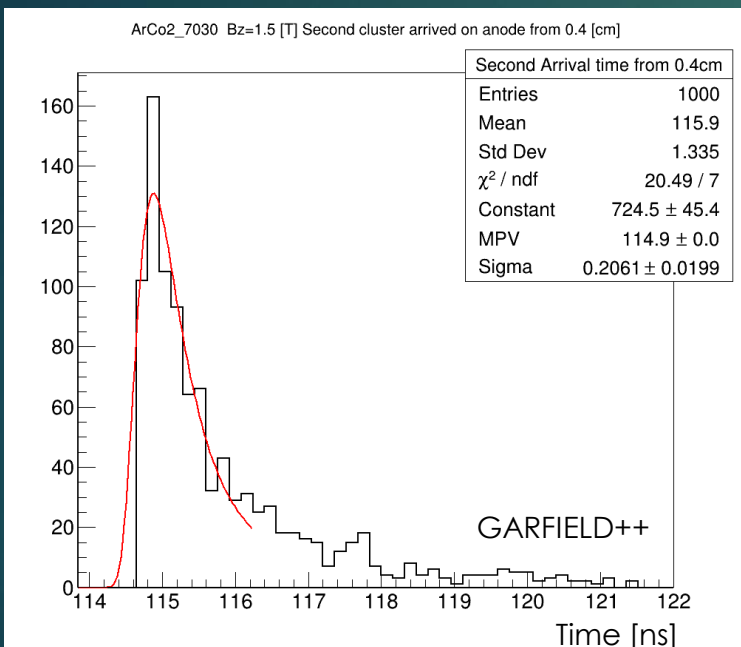
0 5 TDR plots update

Garfield & Garfield++ plots.
 First cluster arrived Bz= 1.5 [T].
 Straw d = 10 [mm], radius Track = 4[mm]



0 5 TDR plots update

Second cluster arrived Bz= 1.5 [T].
Garfield & Garfield++ plots.
straw d = 10 [mm], radius track = 4[mm]

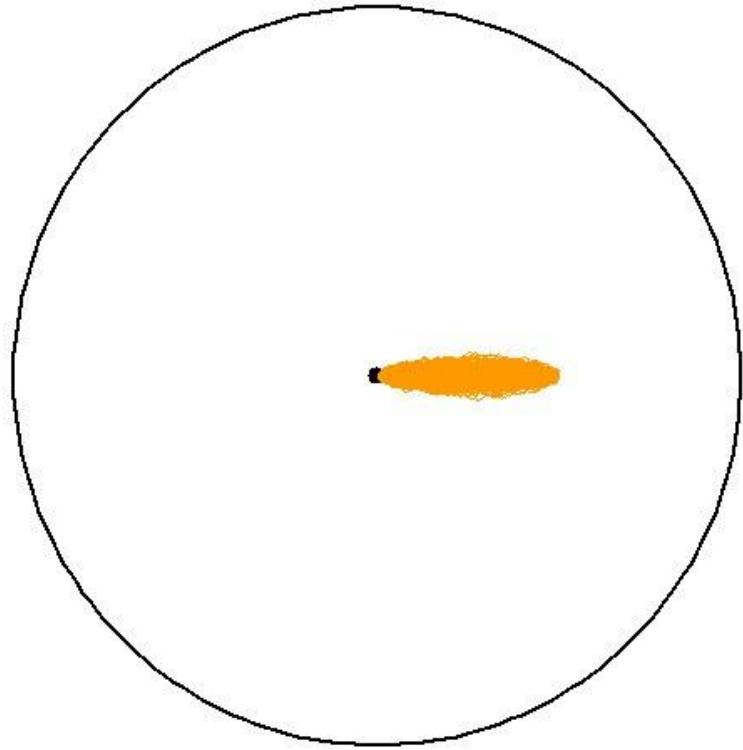


END

background

Drift lines

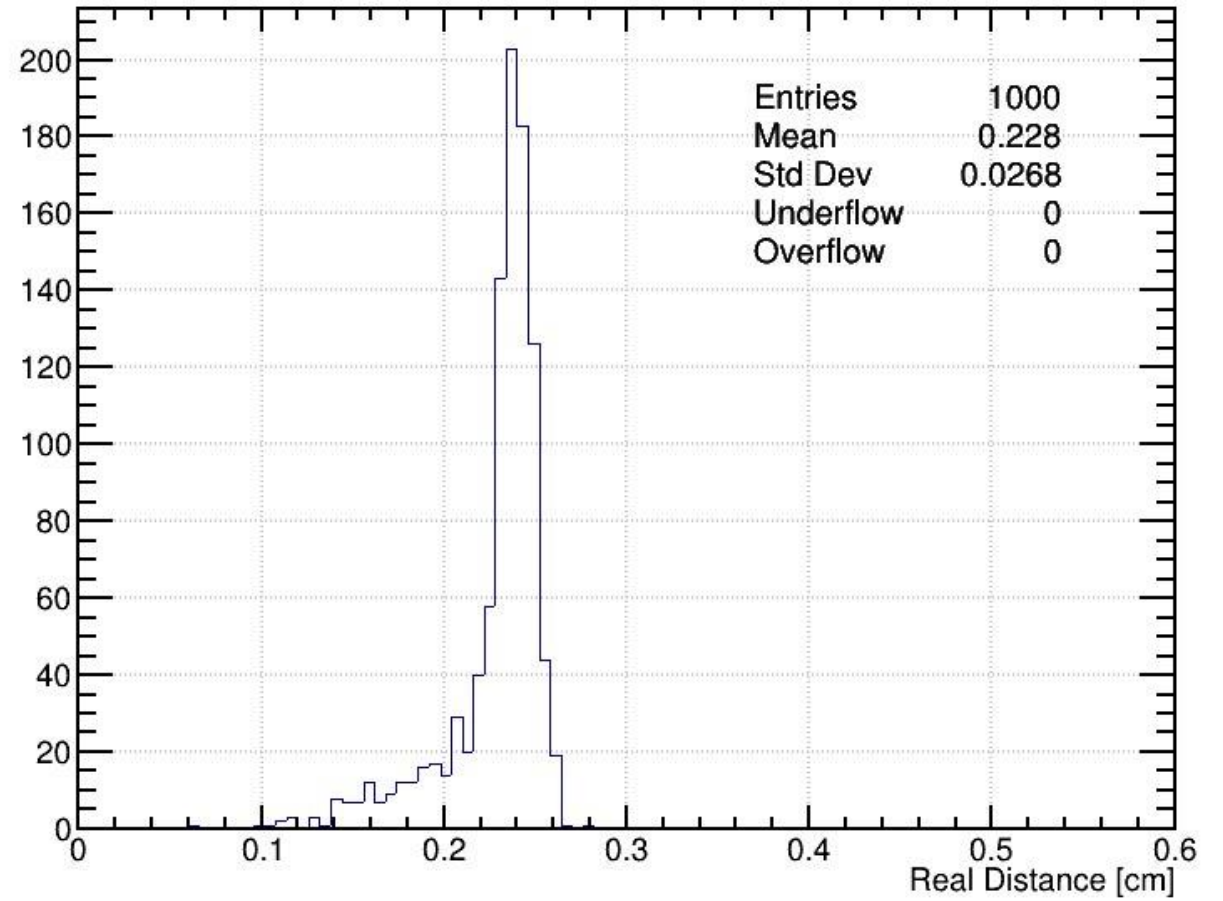
File Edit View Options Tools Help



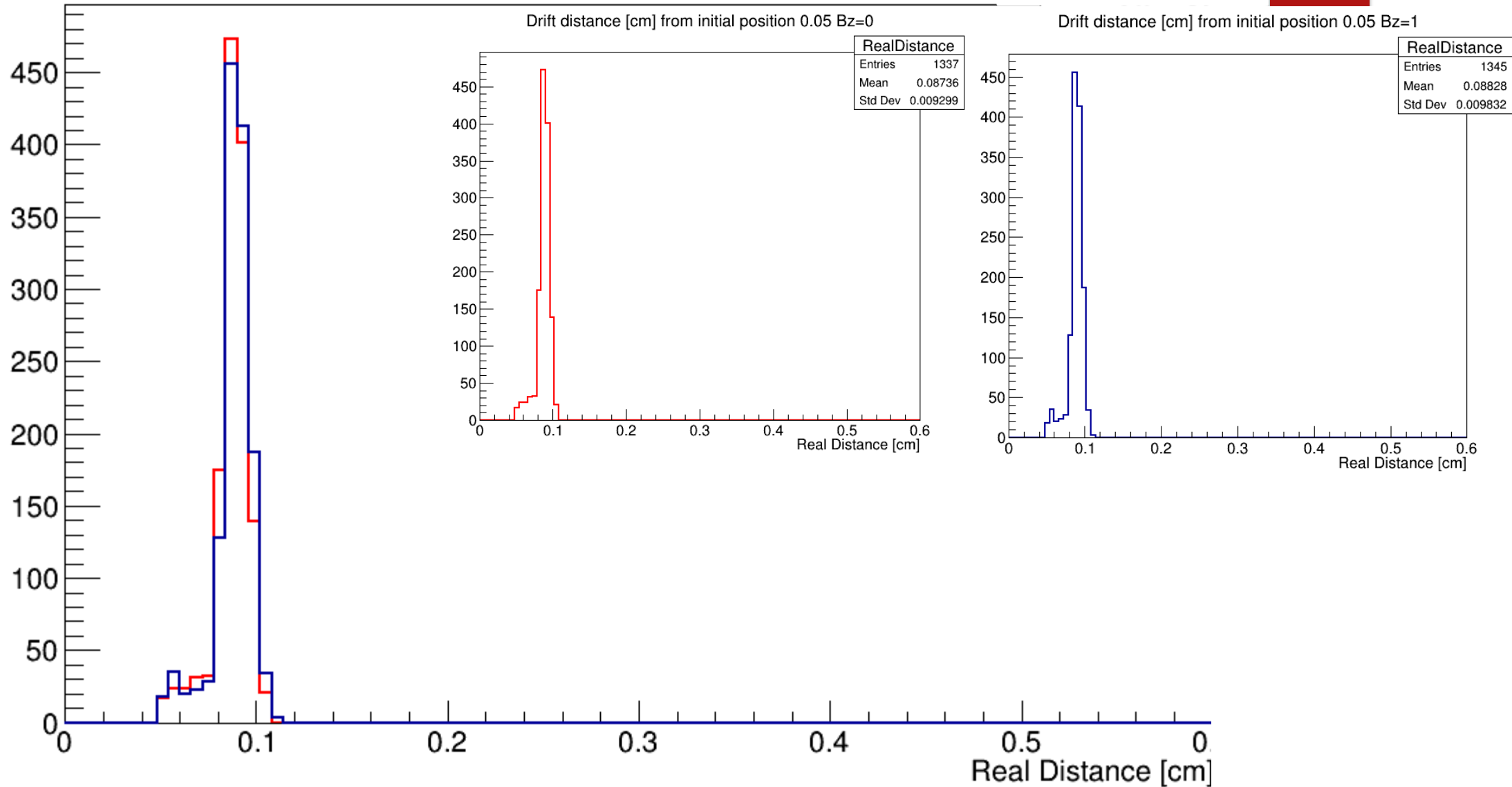
rTube = 3mm

Difference between the initial distance(0.15 cm) from the wire and the actual drift path

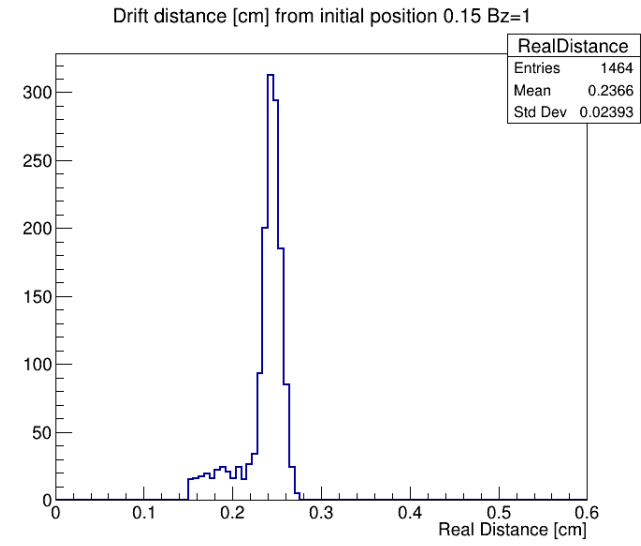
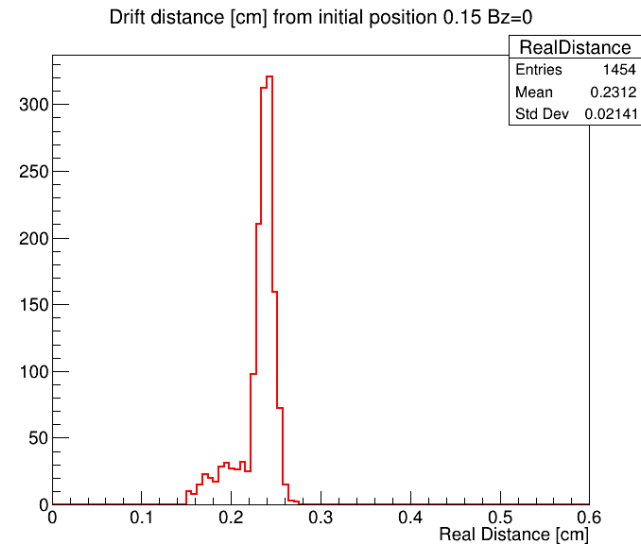
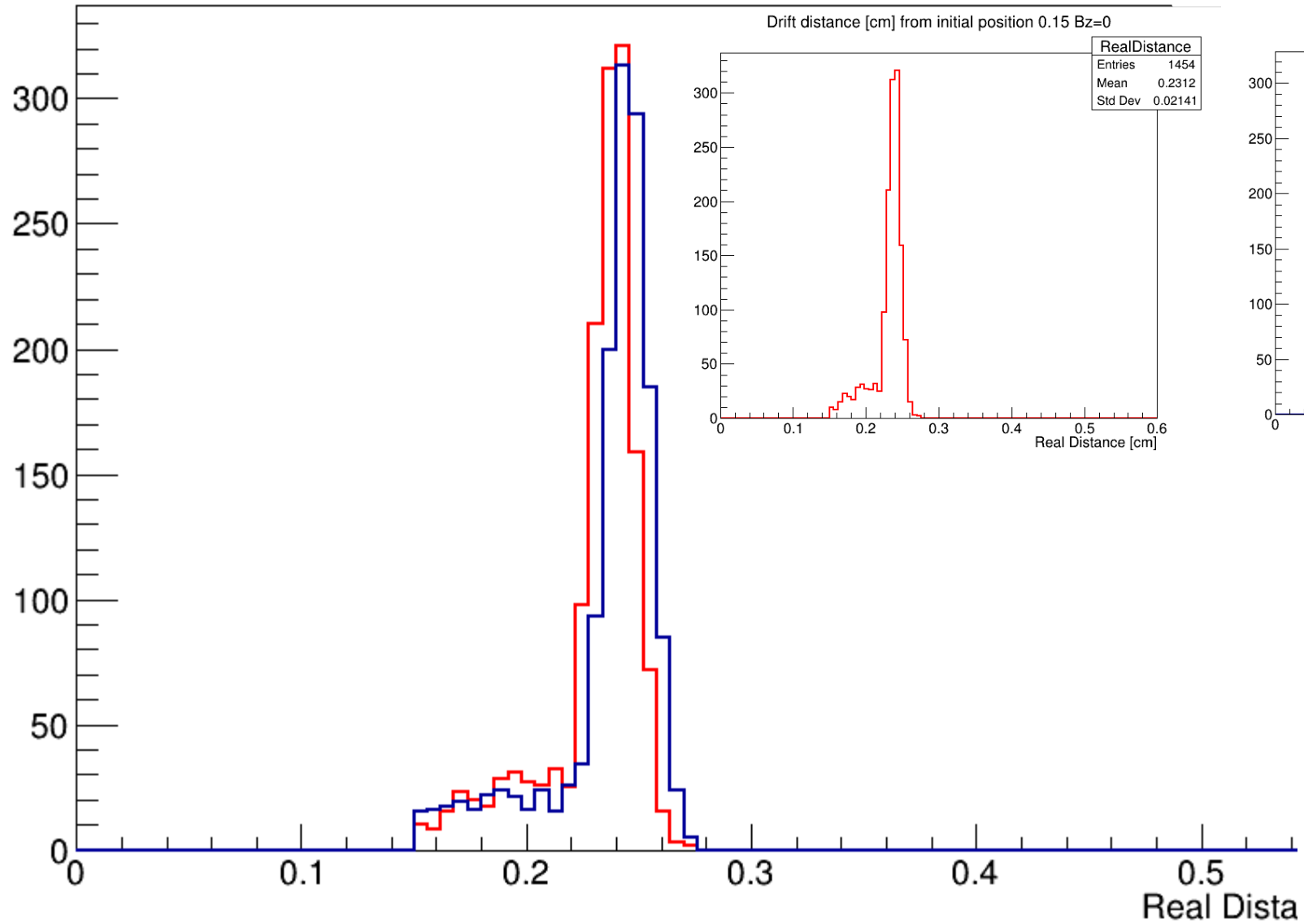
File Edit View Options Tools Help



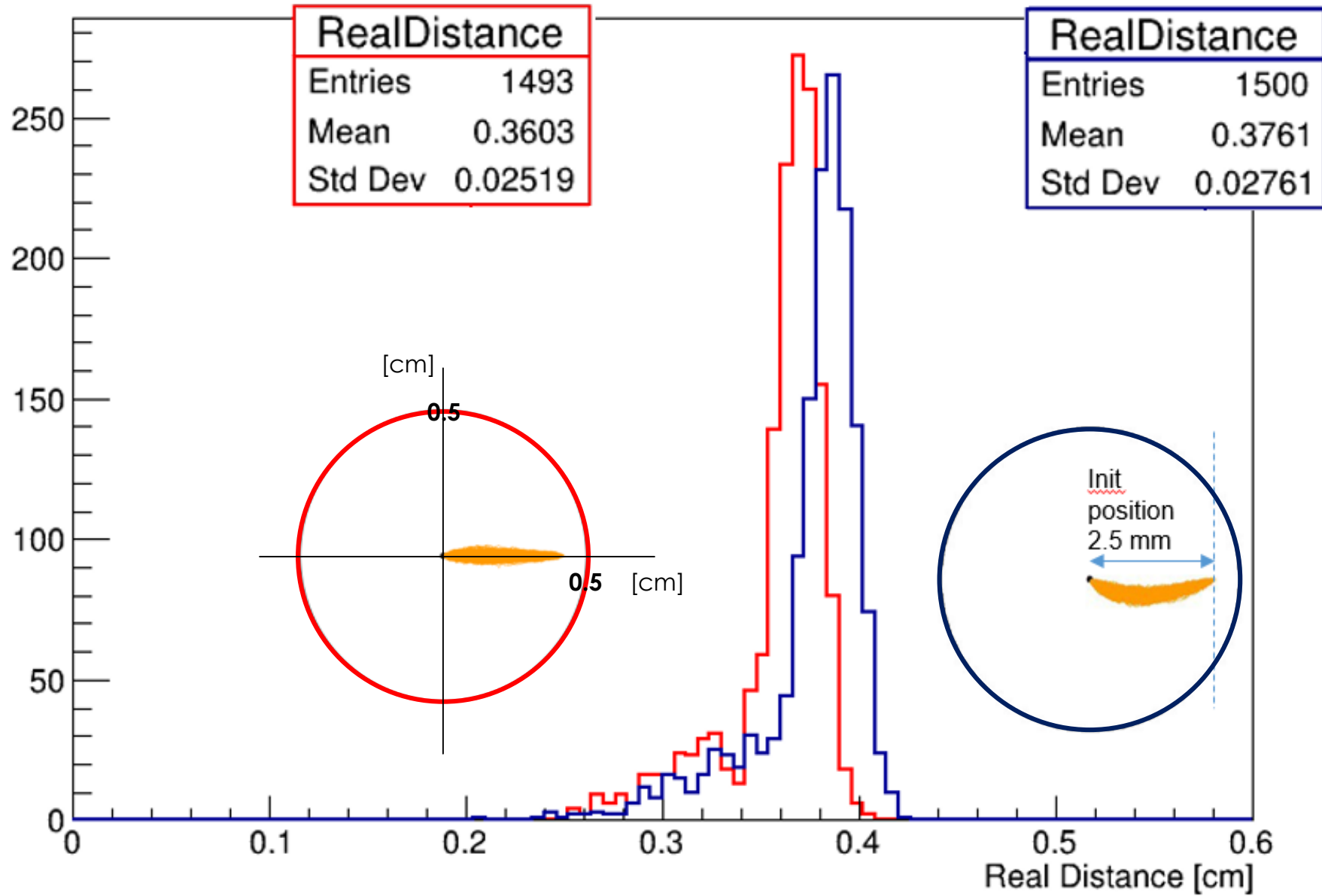
Drift distance [cm] from initial position 0.05[cm]



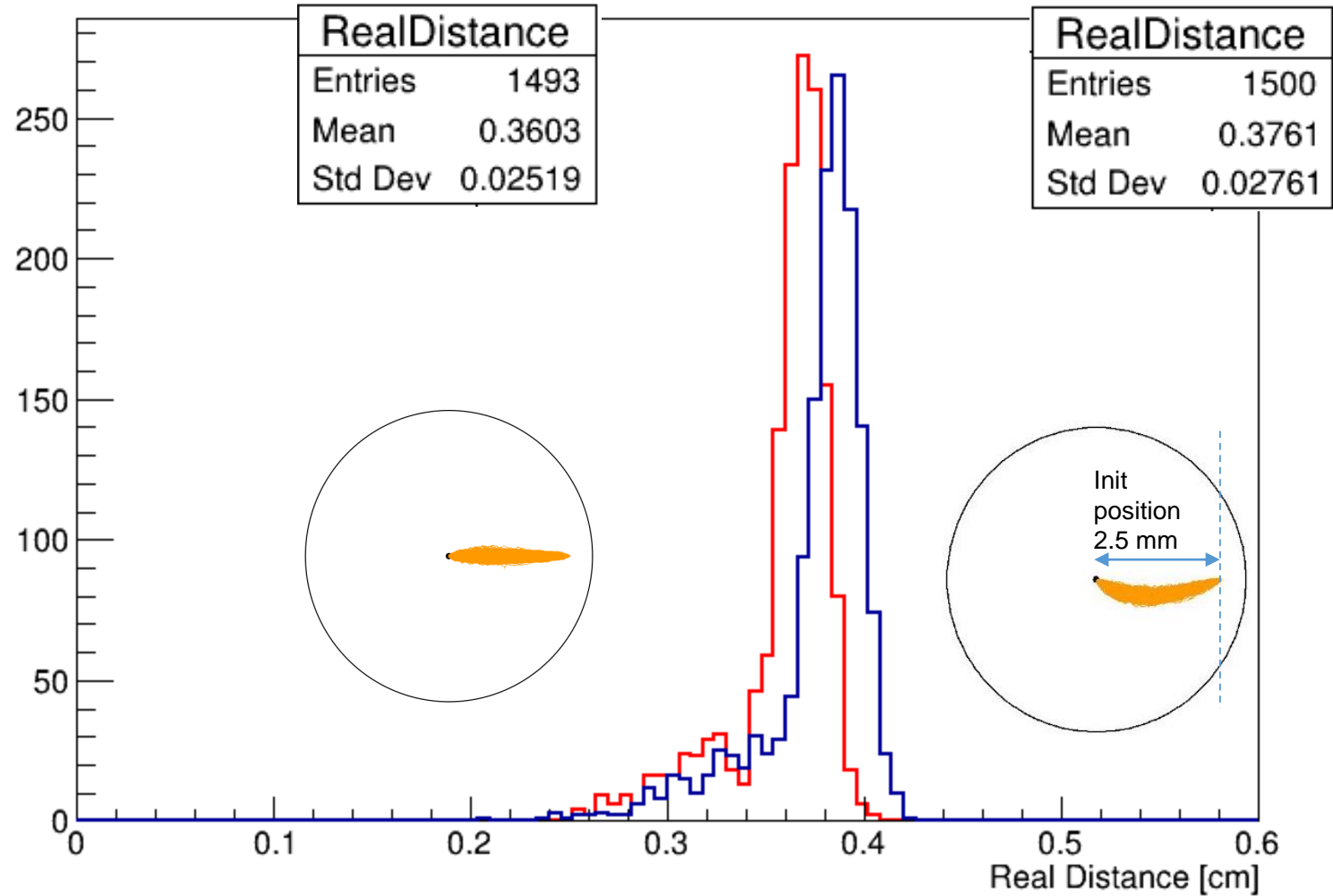
Drift distance [cm] from initial position 0.15[cm]



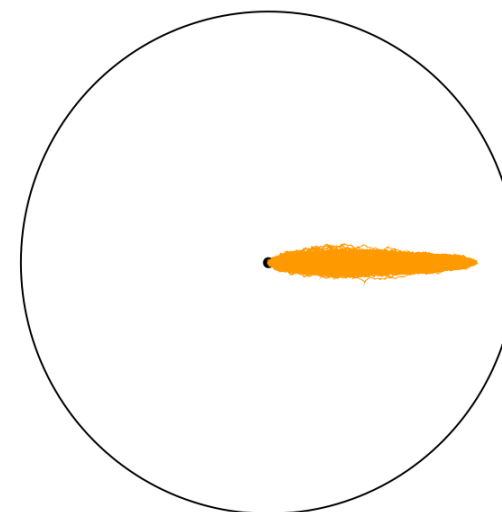
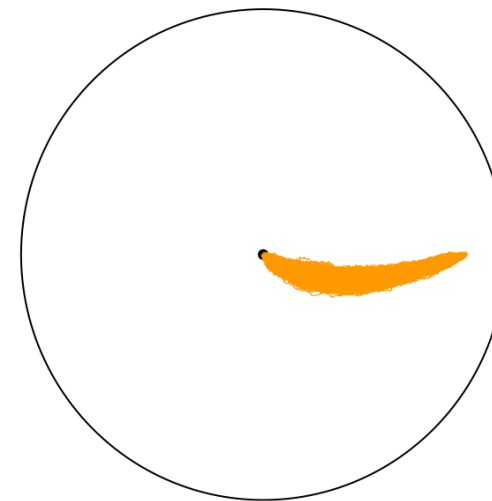
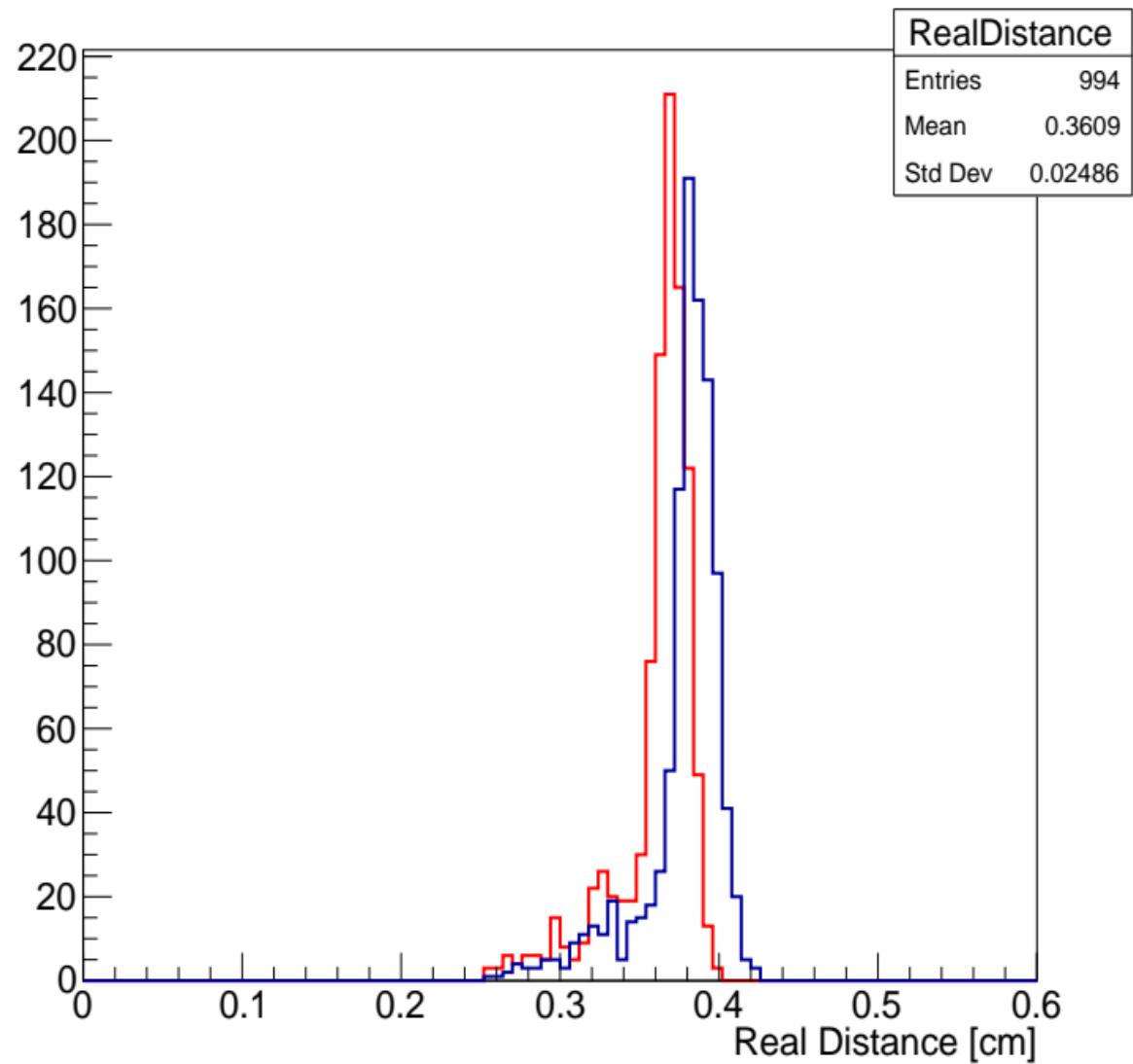
Drift distance [cm] from initial position 0.25[cm]



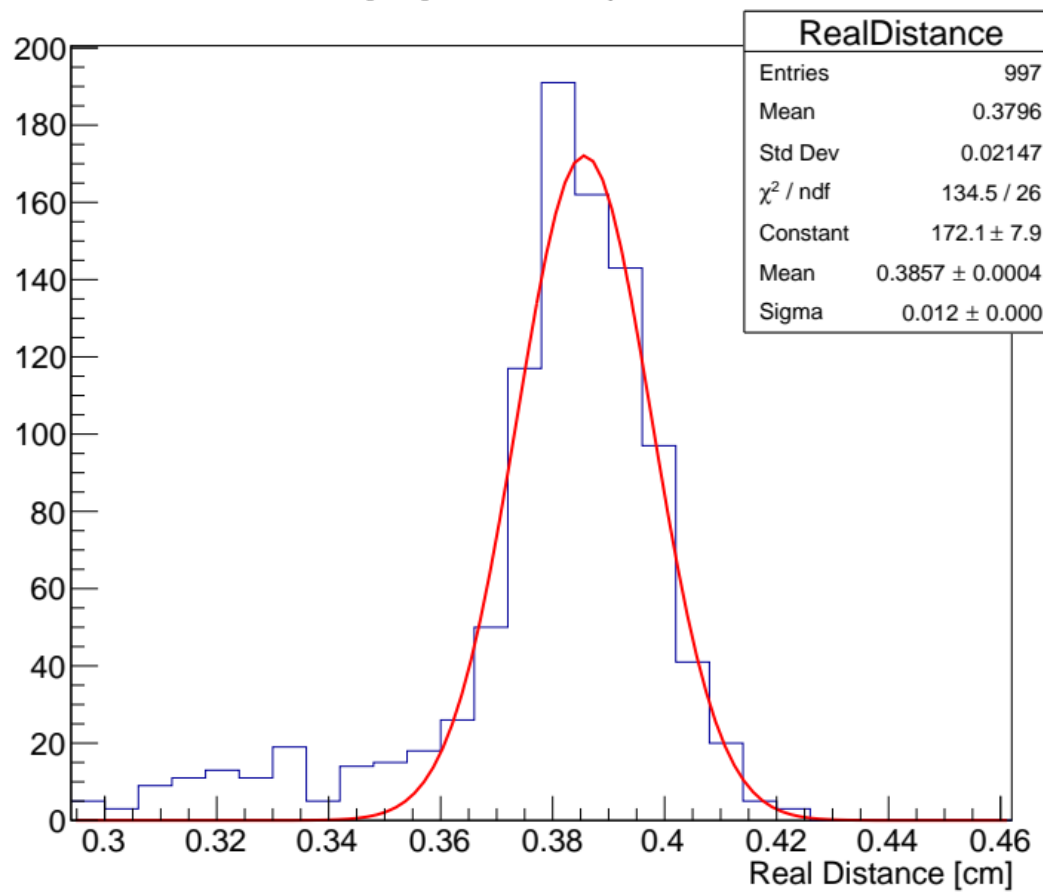
Drift distance [cm] from initial position 0.25[cm]



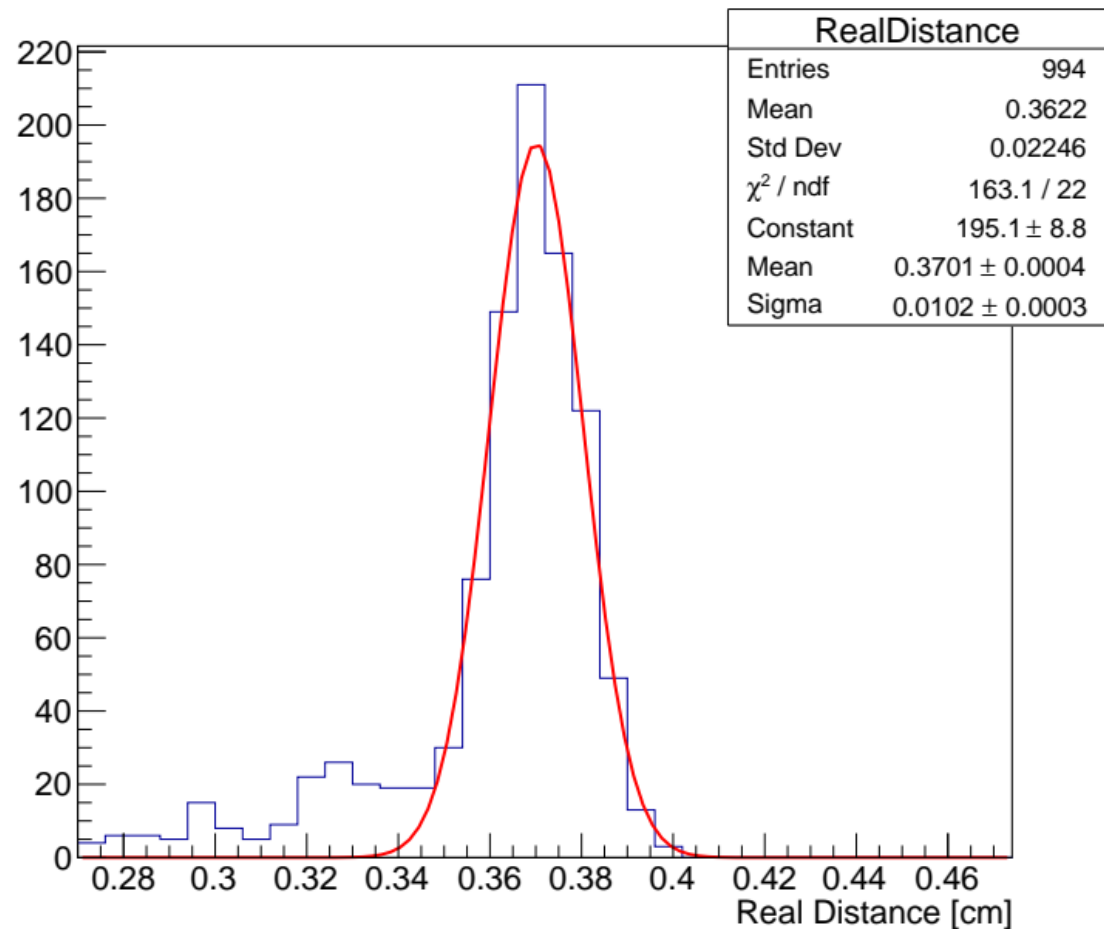
Drift distance [cm] from initial position 0.25 Bz=0



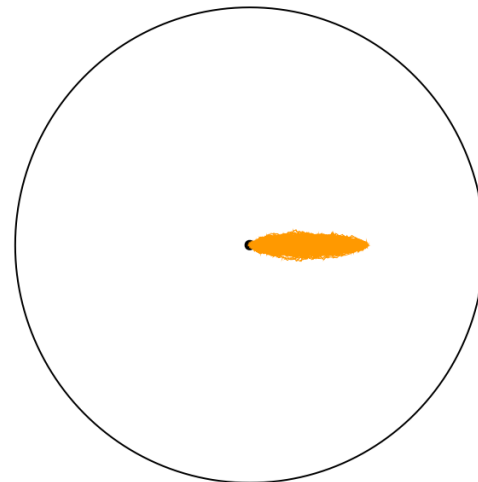
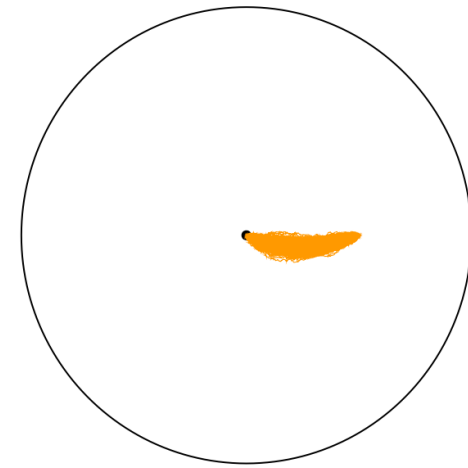
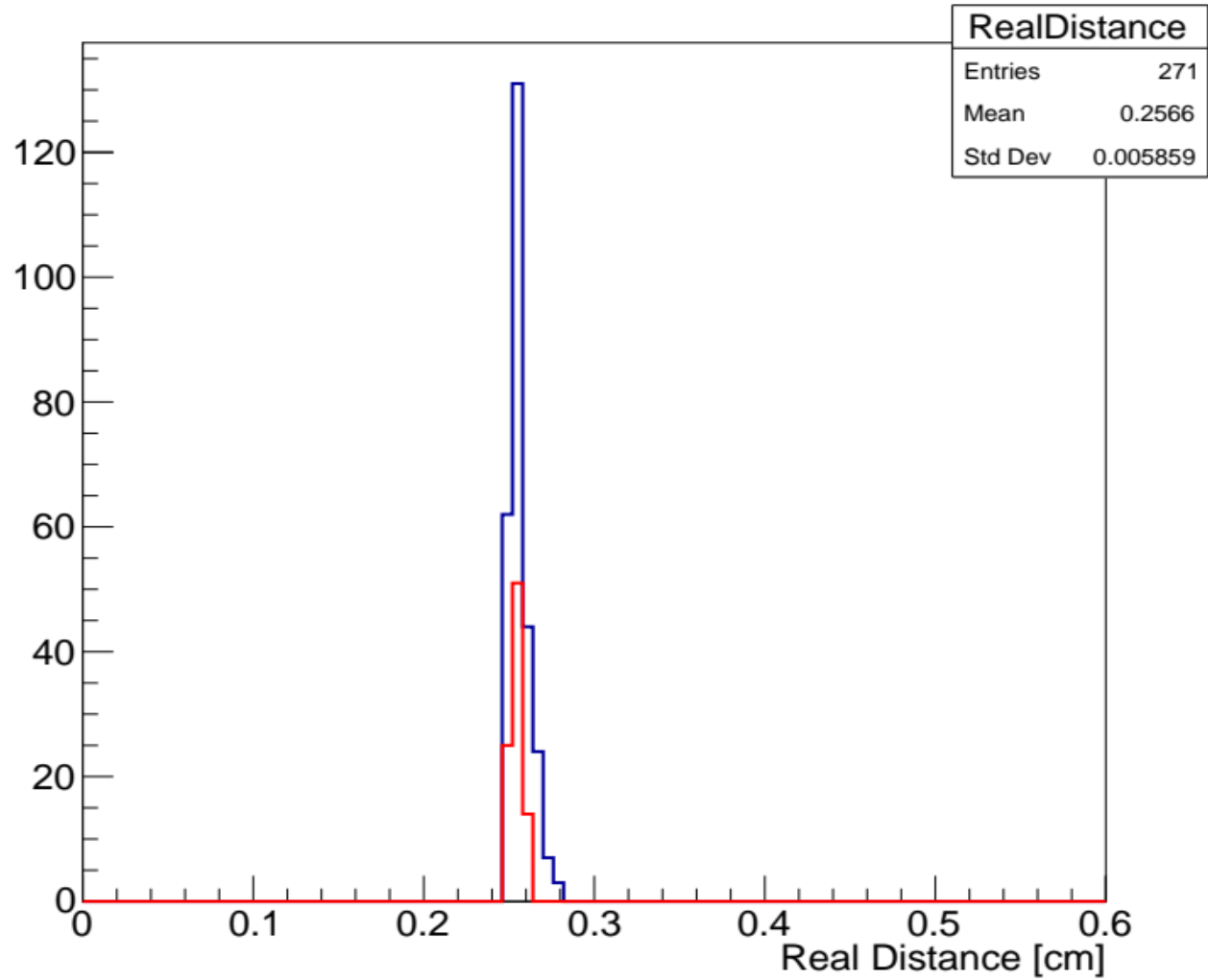
Drift distance [cm] from initial position 0.25 Bz=1



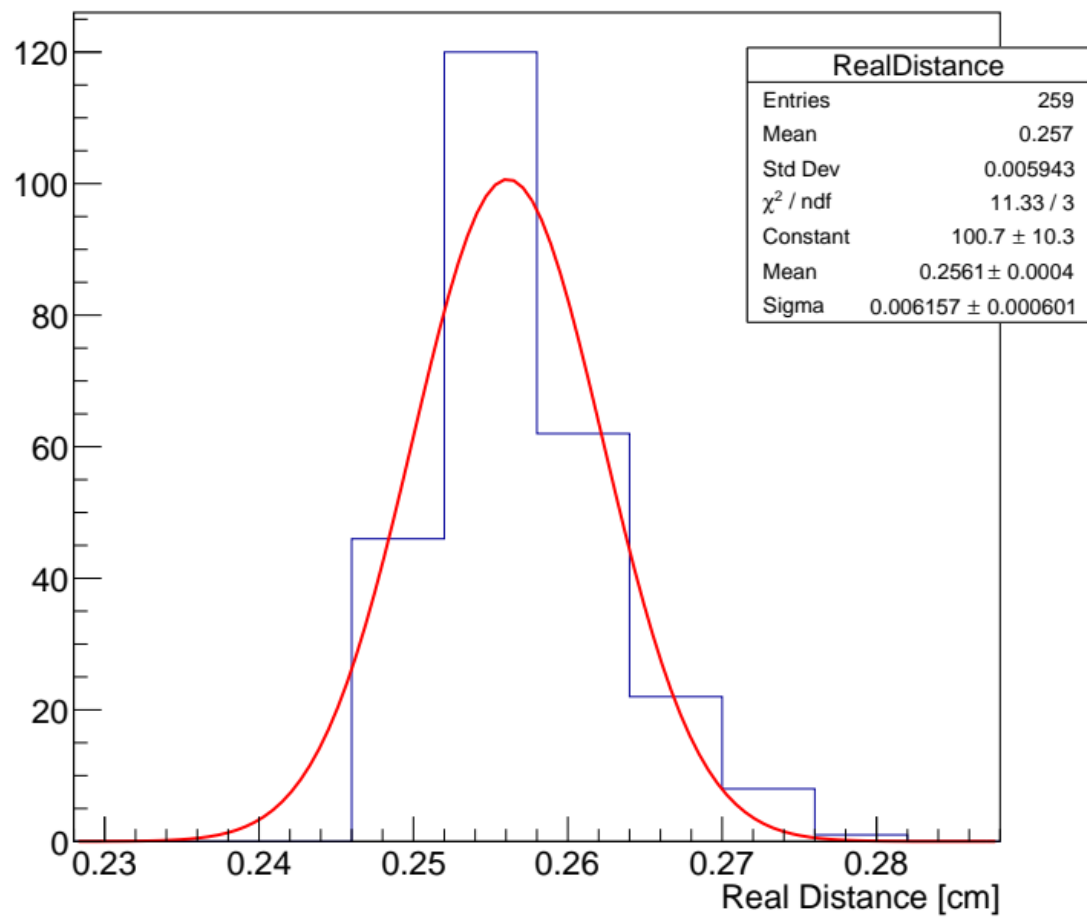
Drift distance [cm] from initial position 0.25 Bz=0



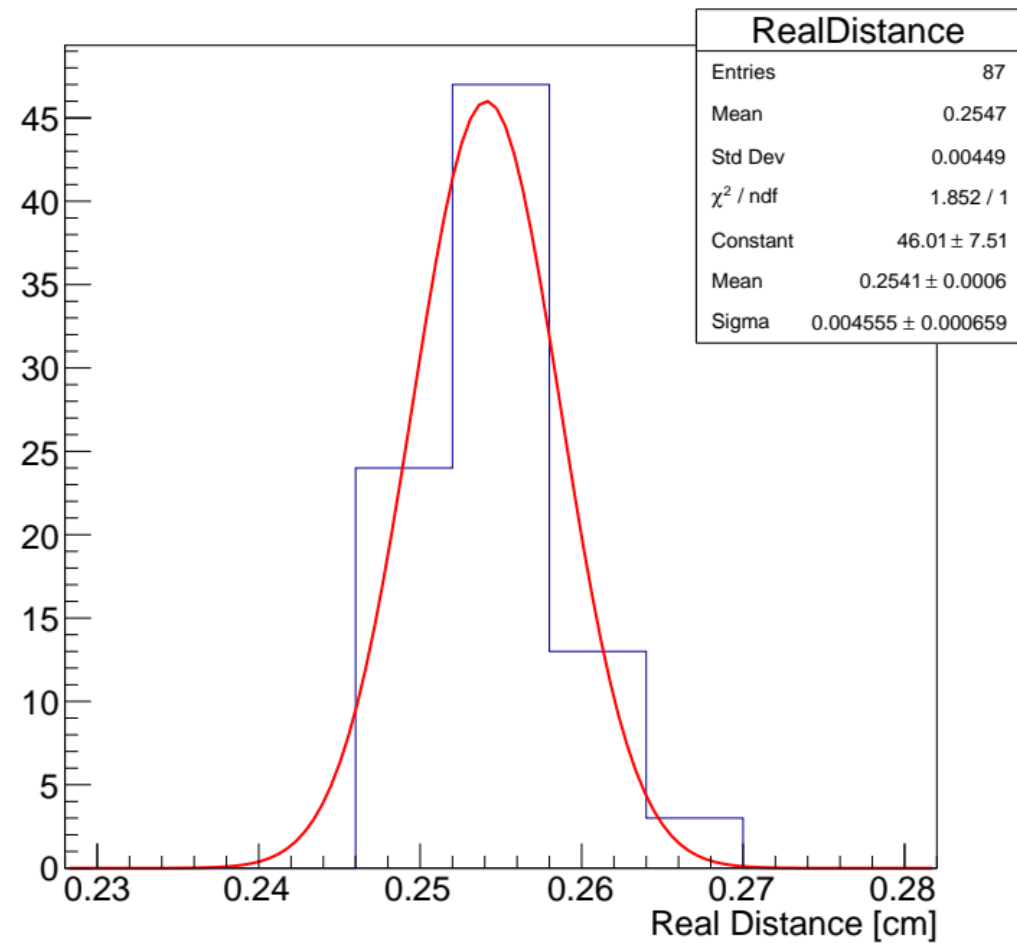
Drift distance [cm] from initial position 0.15 Bz=1



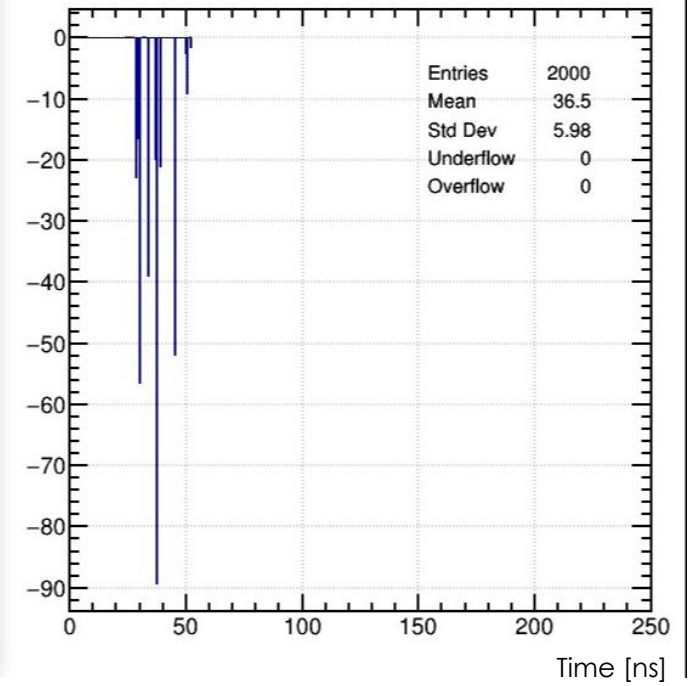
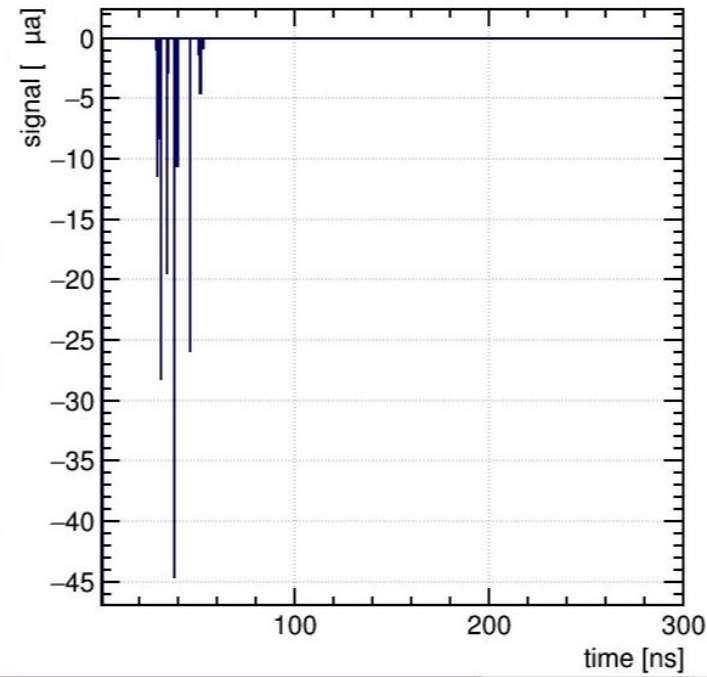
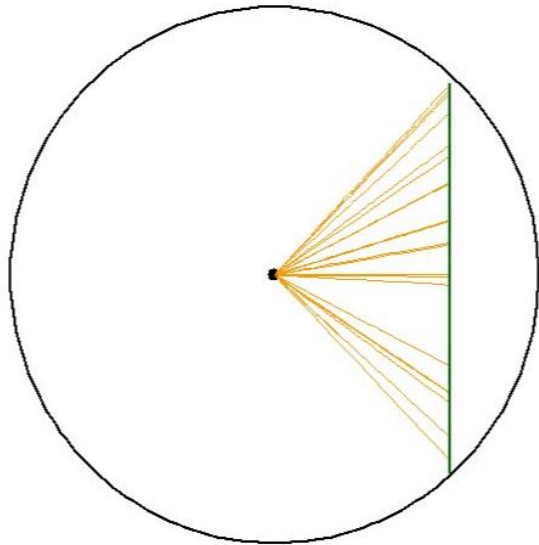
Drift distance [cm] from initial position 0.15 Bz=1

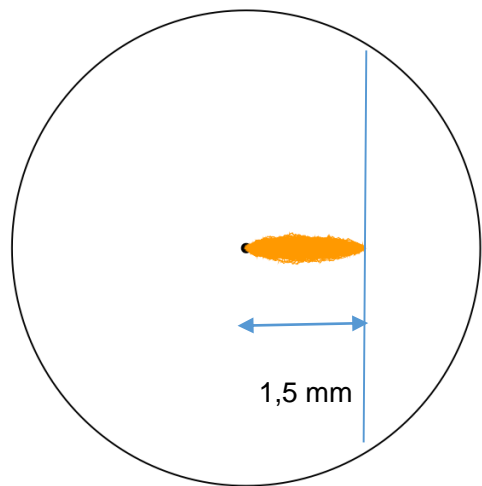
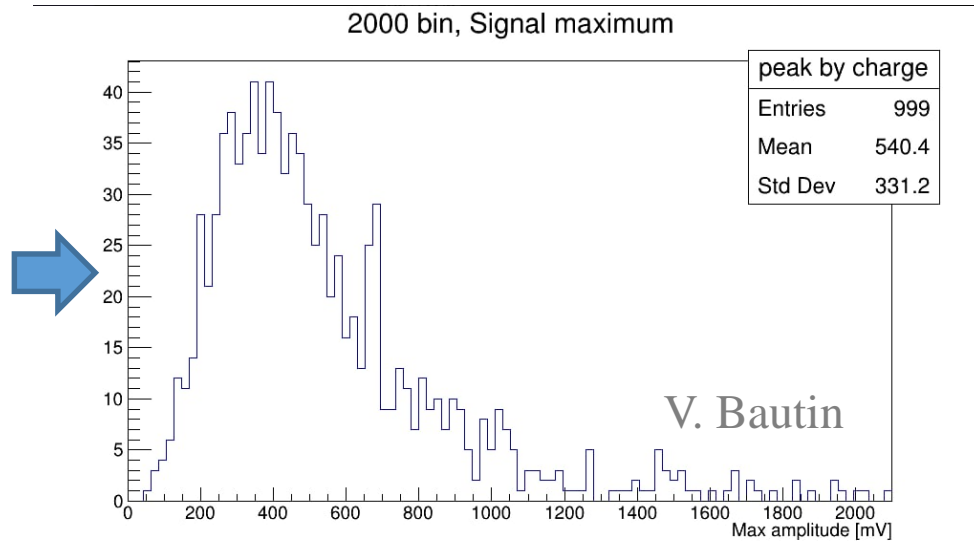
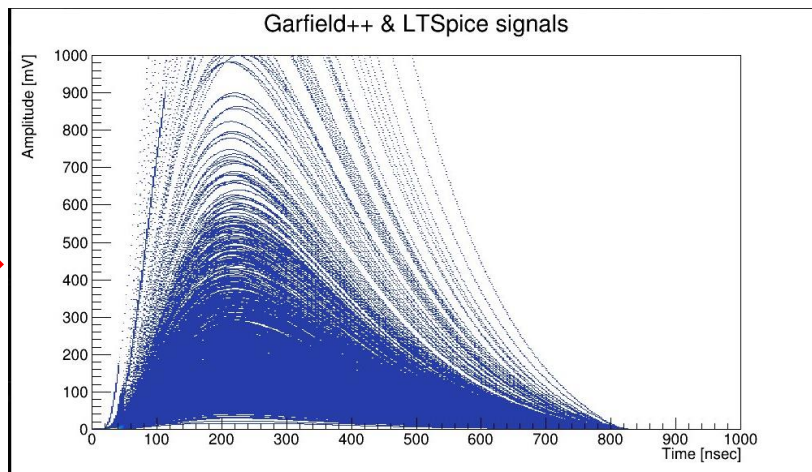
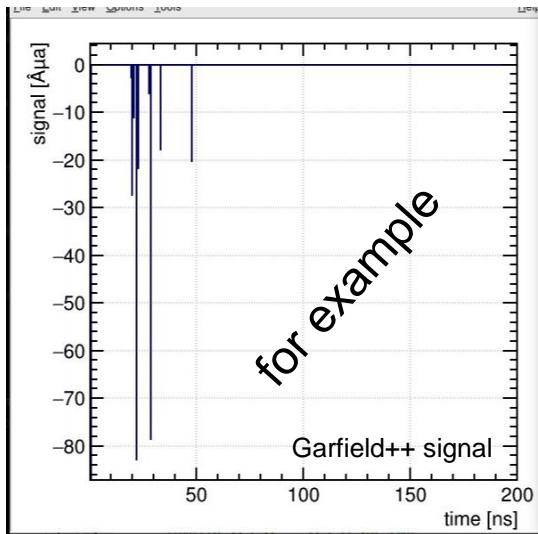


Drift distance [cm] from initial position 0.15 Bz=0

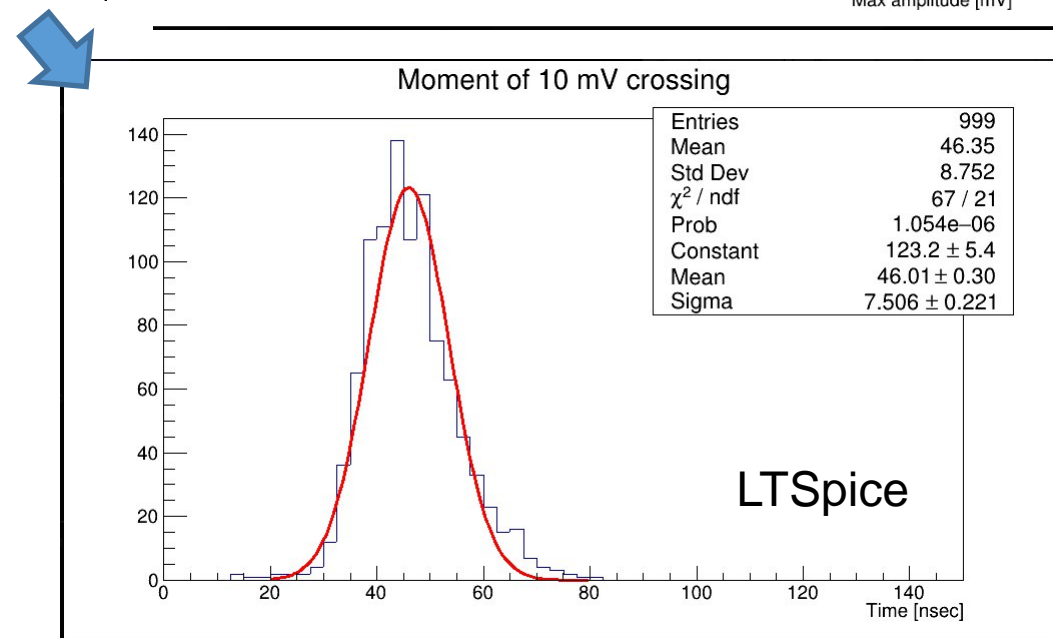
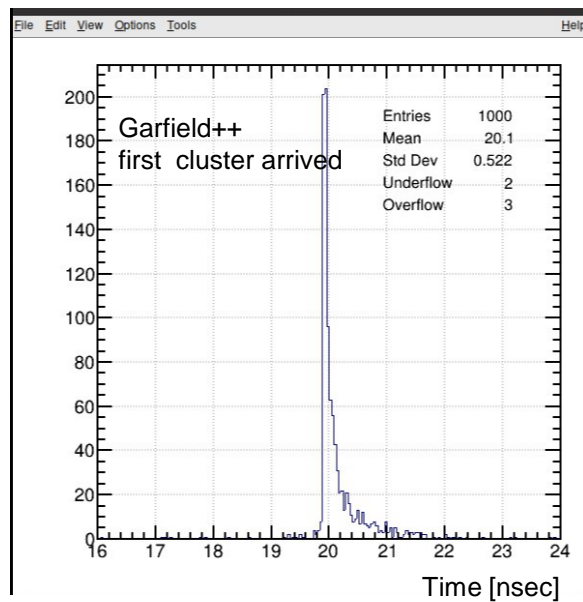


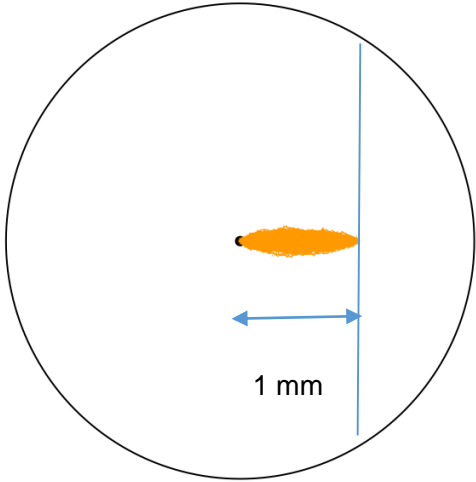
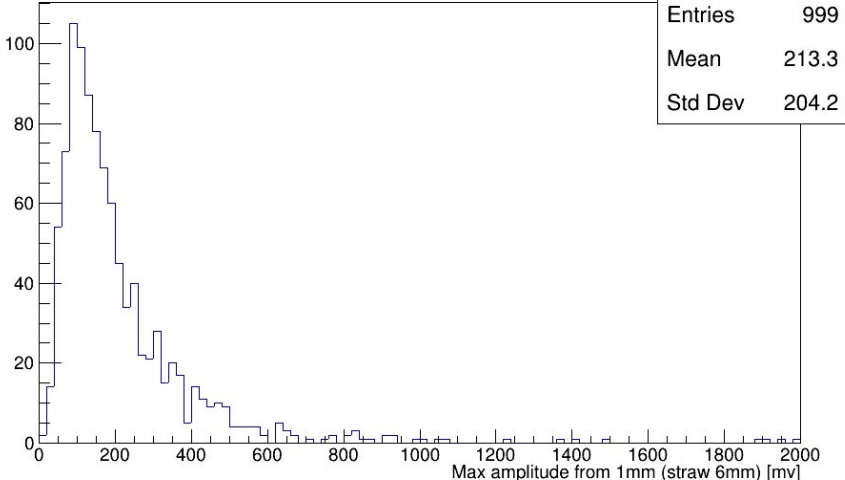
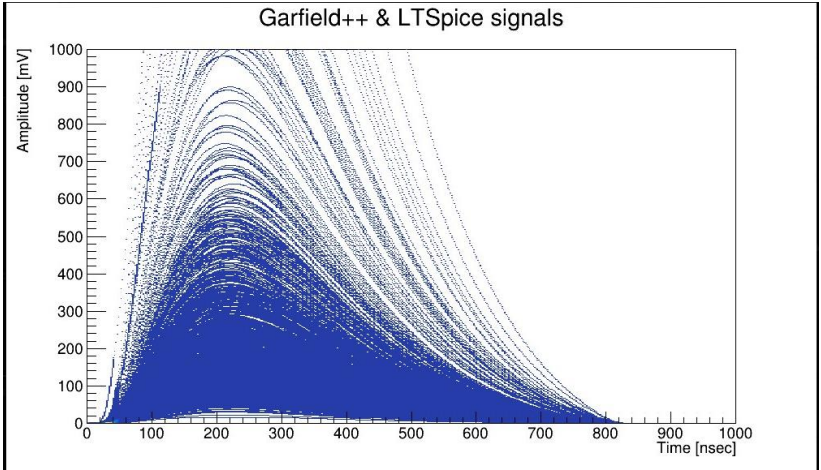
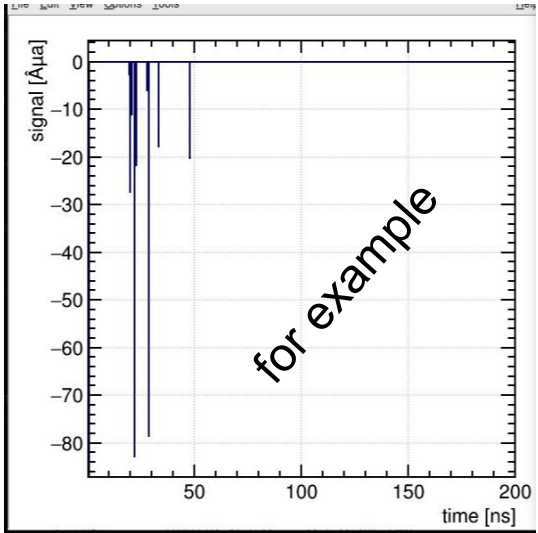
Garfield++ Amplitude BUG



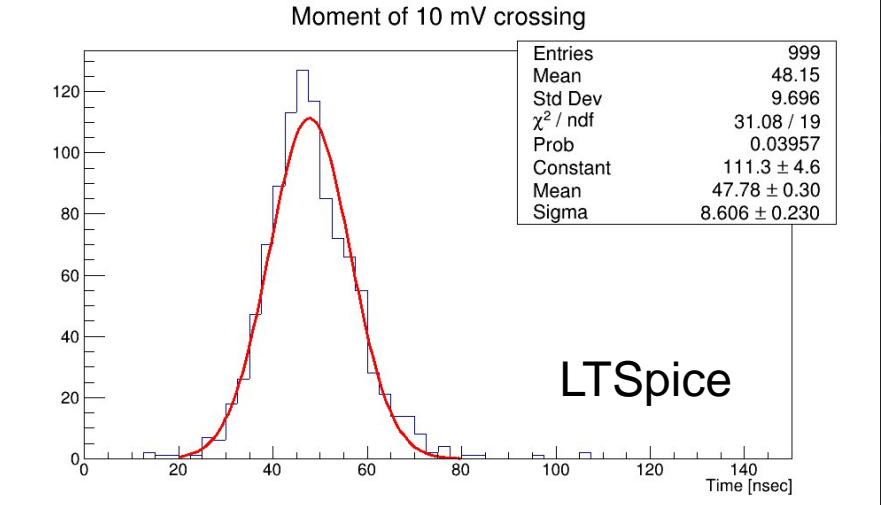
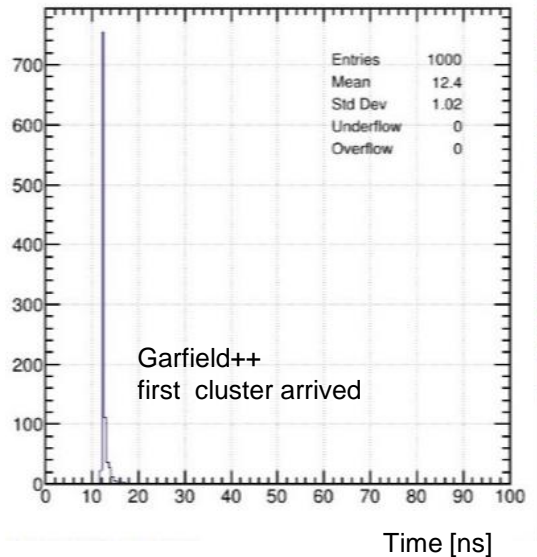


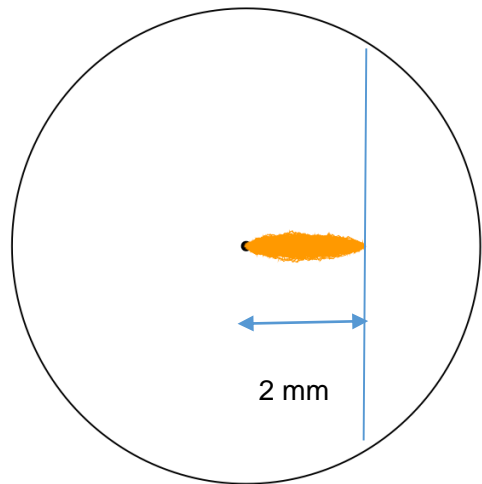
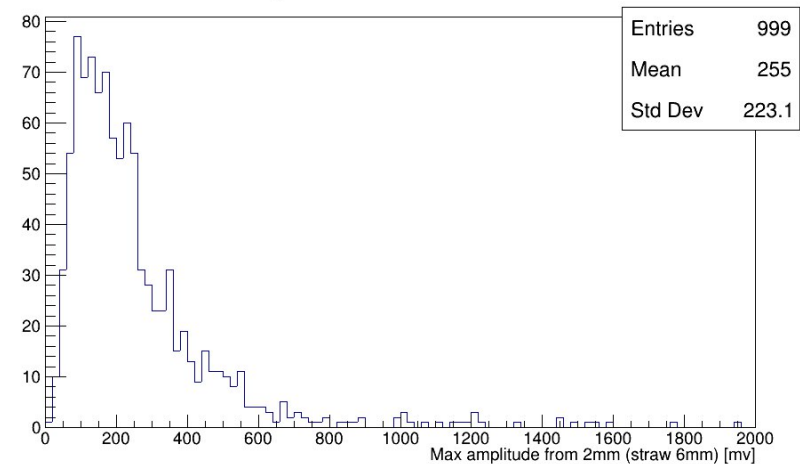
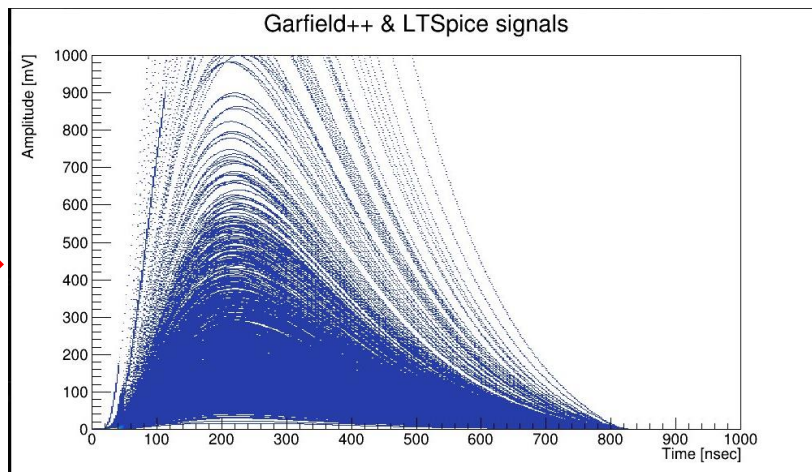
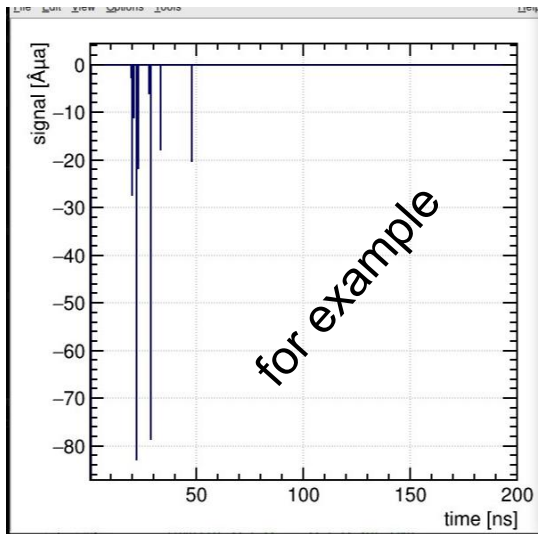
Tube = 6mm



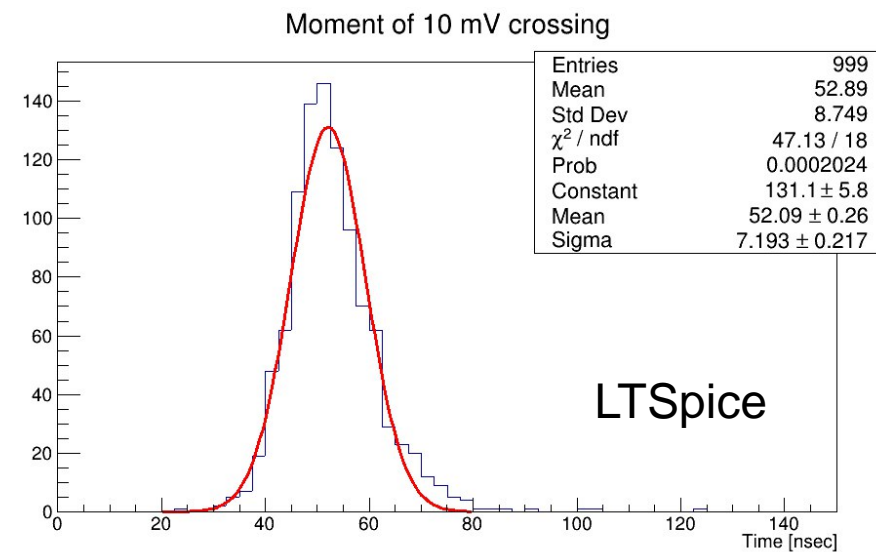
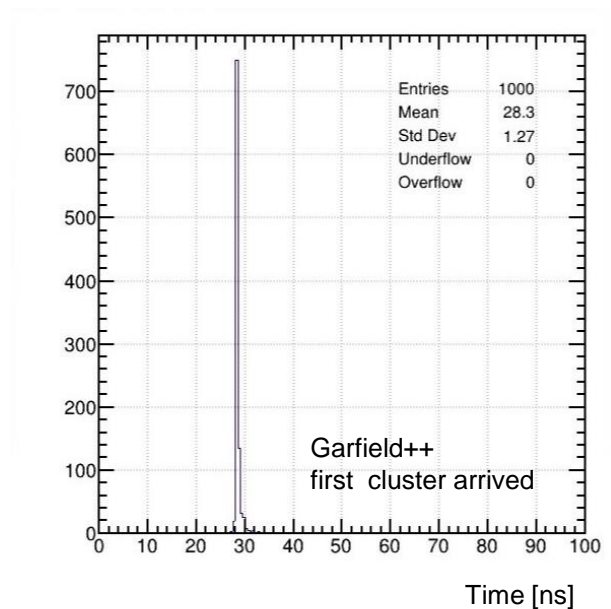


Tube = 6mm





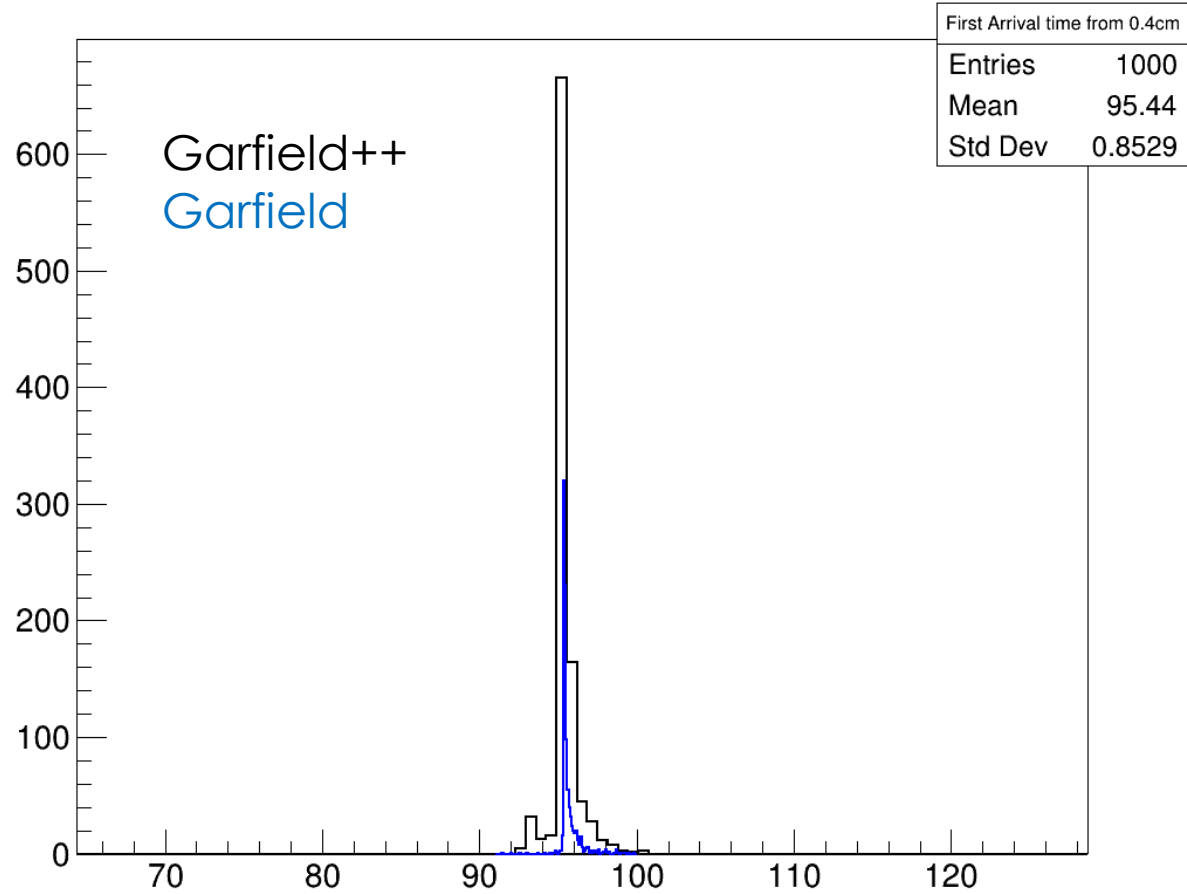
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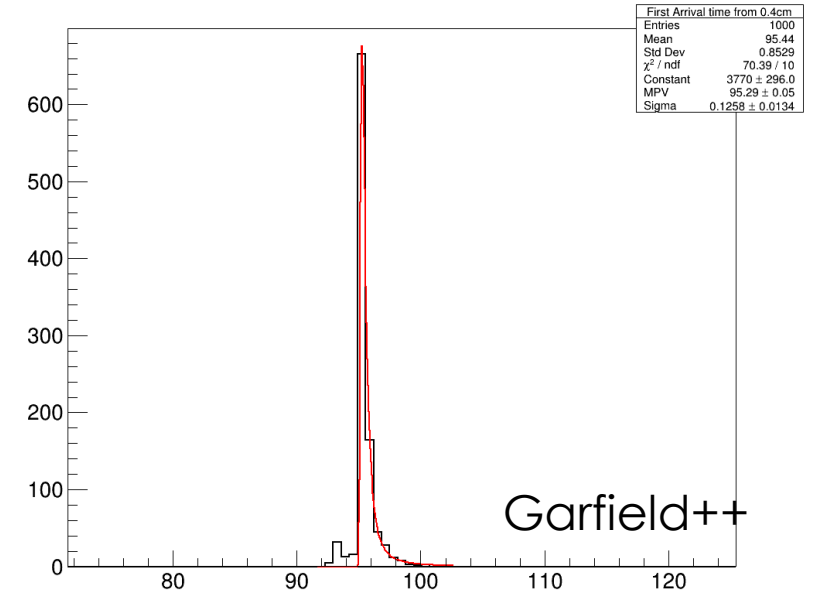
TDR Garfield & Garfield++

comparison of XT relation

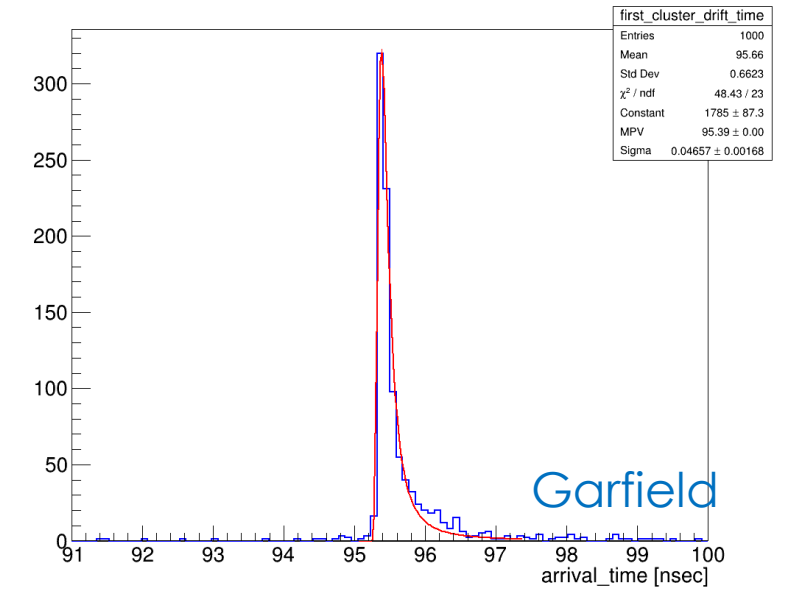
ArCo2_7030 Bz=0 [T] First cluster arrived on anode from 0.4 [cm]



ArCo2_7030 Bz=0 [T] First cluster arrived on anode from 0.4 [cm]



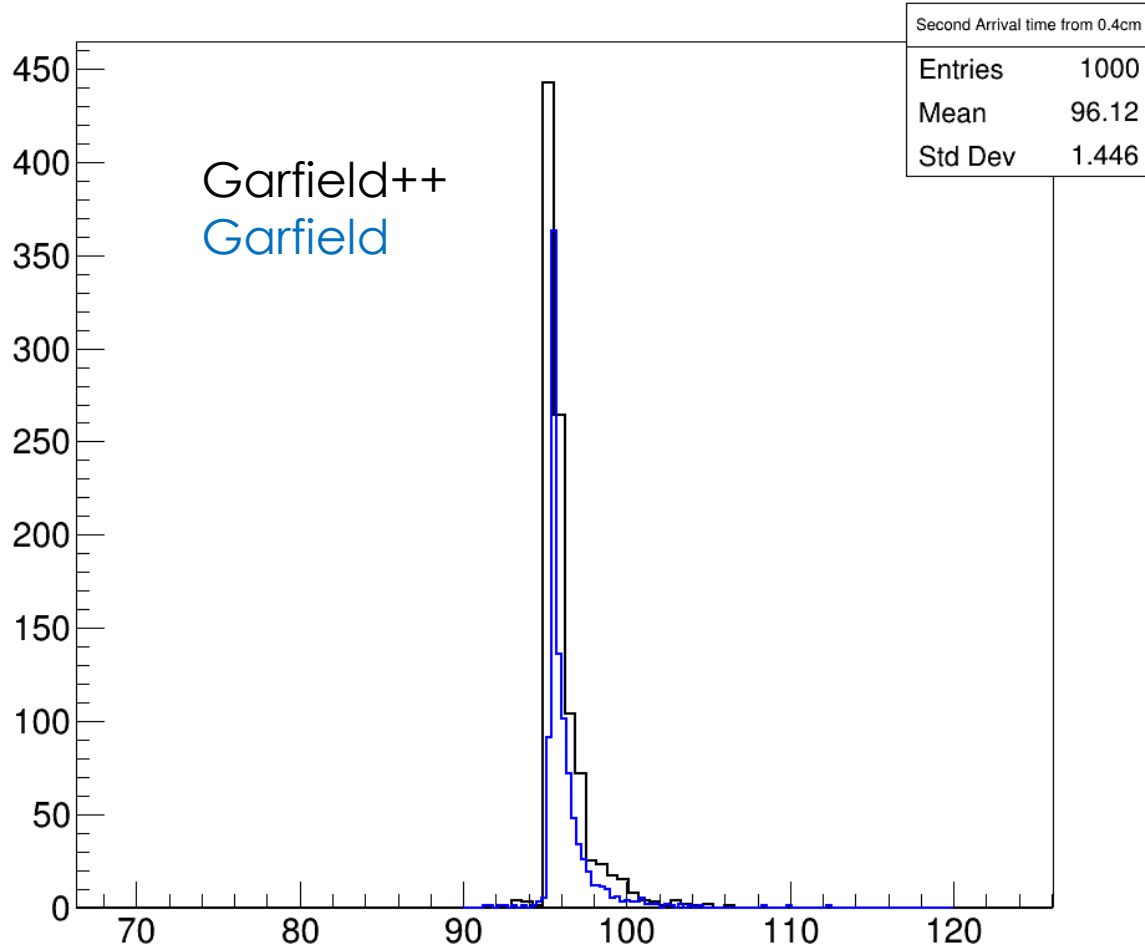
first cluster drift time, zero field



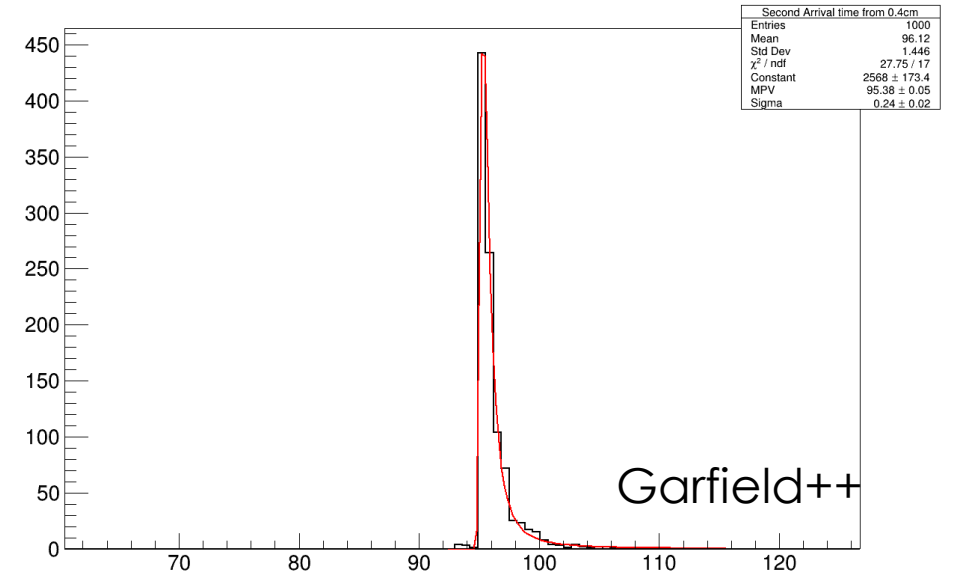
TDR Garfield & Garfield++

comparison of XT relation

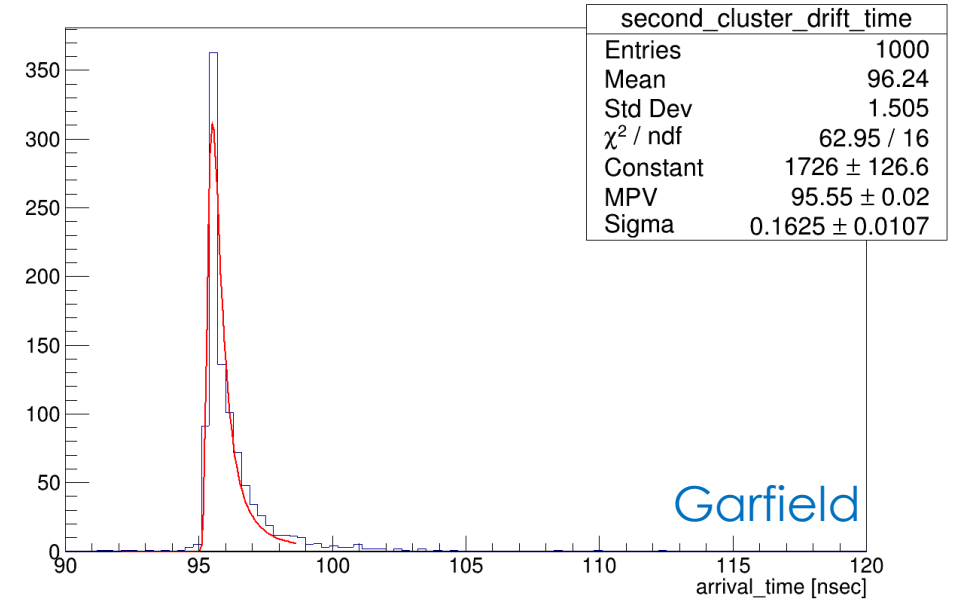
ArCo2_7030 Bz=0 [T] Second cluster arrived on anode from 0.4 [cm]



ArCo2_7030 Bz=0 [T] Second cluster arrived on anode from 0.4 [cm]

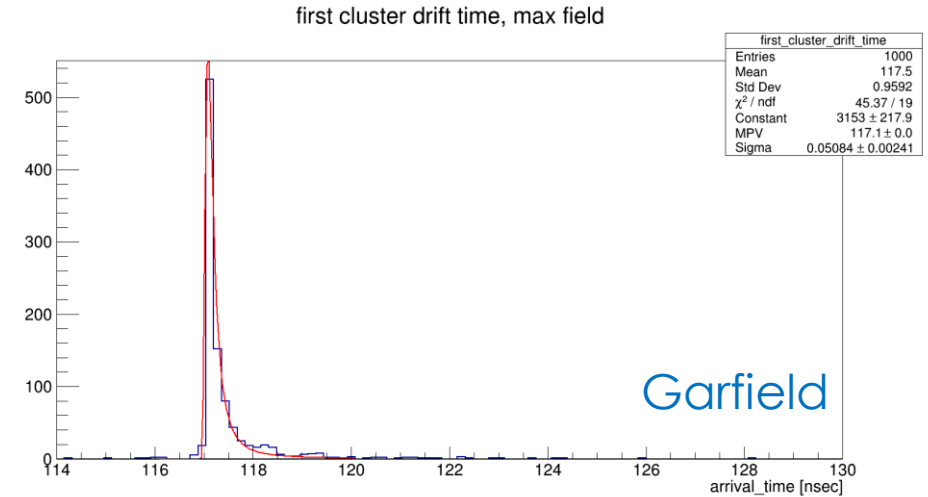
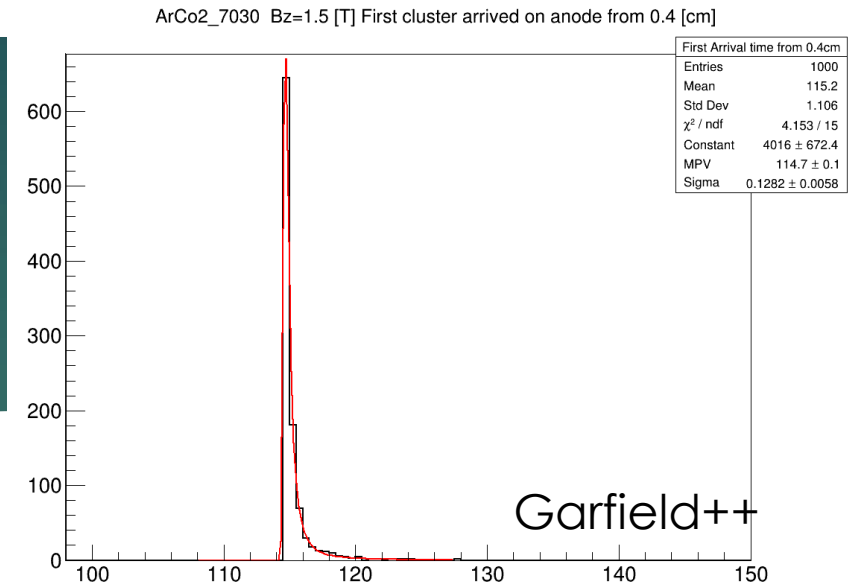
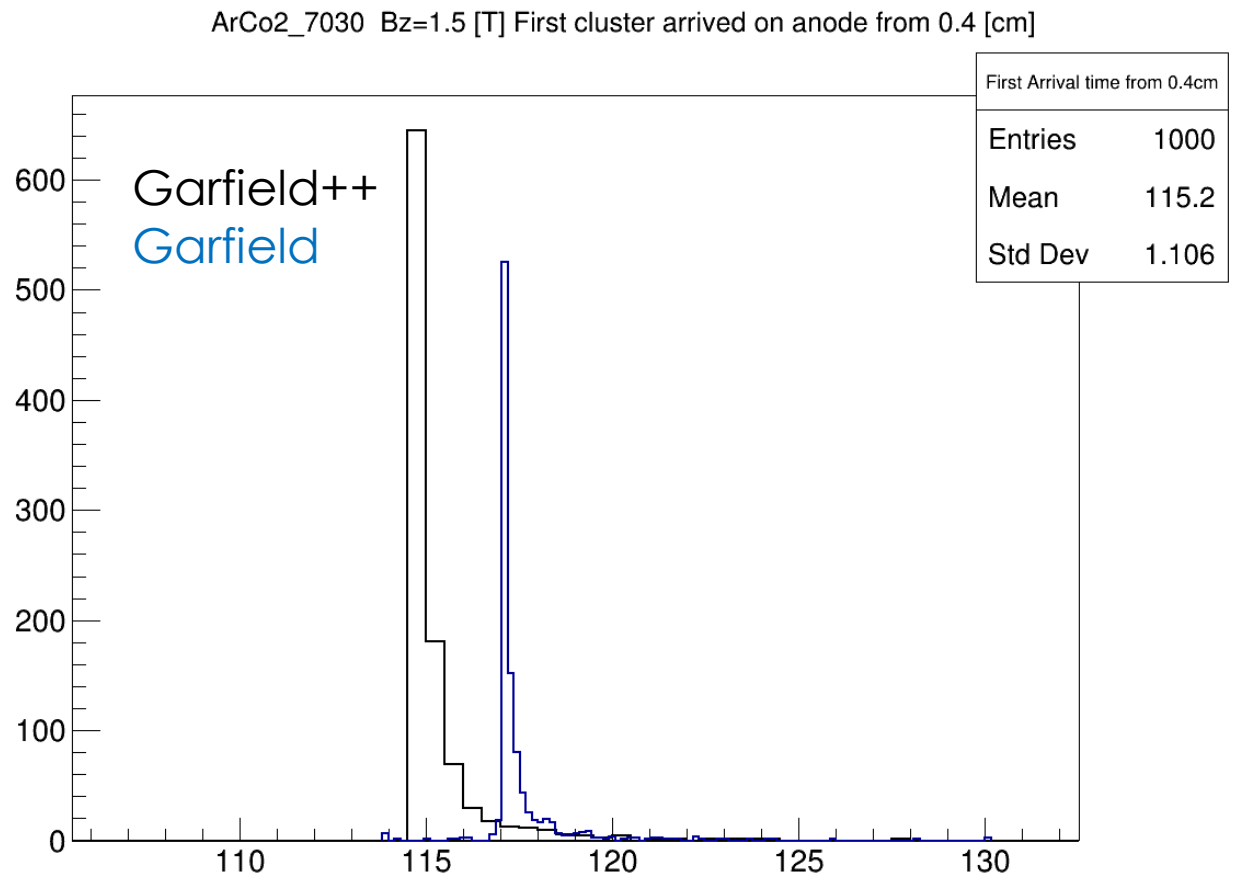


second cluster drift time, zero field



TDR Garfield & Garfield++

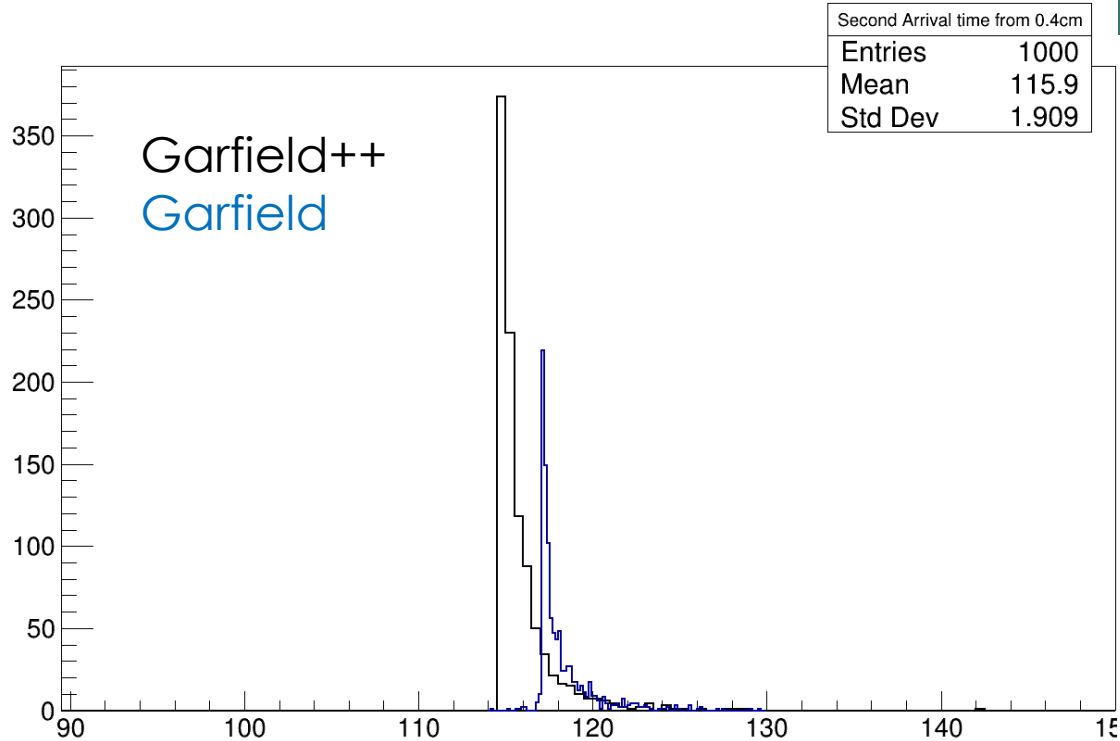
comparison of XT relation



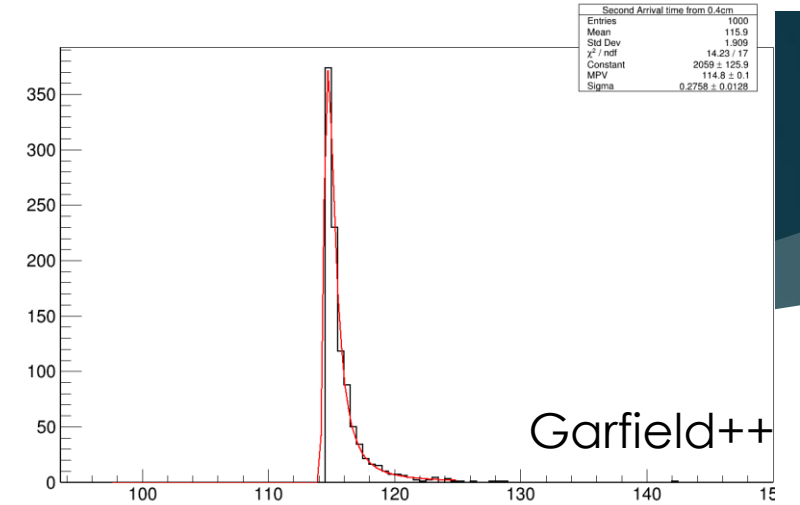
TDR Garfield & Garfield++

comparison of XT relation

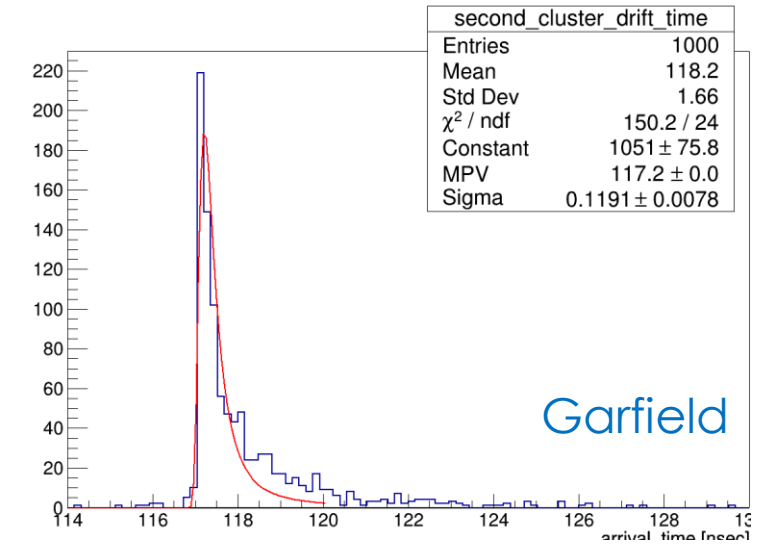
ArCo2_7030 Bz=1.5 [T] Second cluster arrived on anode from 0.4 [cm]



ArCo2_7030 Bz=1.5 [T] Second cluster arrived on anode from 0.4 [cm]



second cluster drift time, max field



Gas gain problem. Garfield & Garfield++

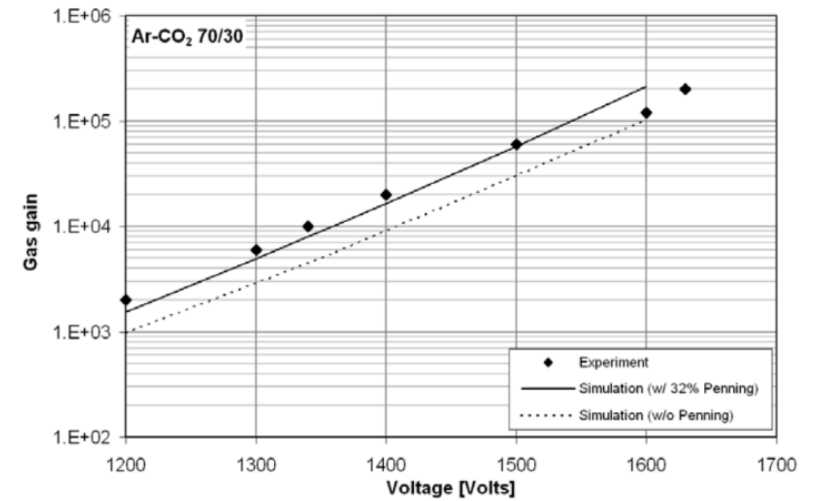
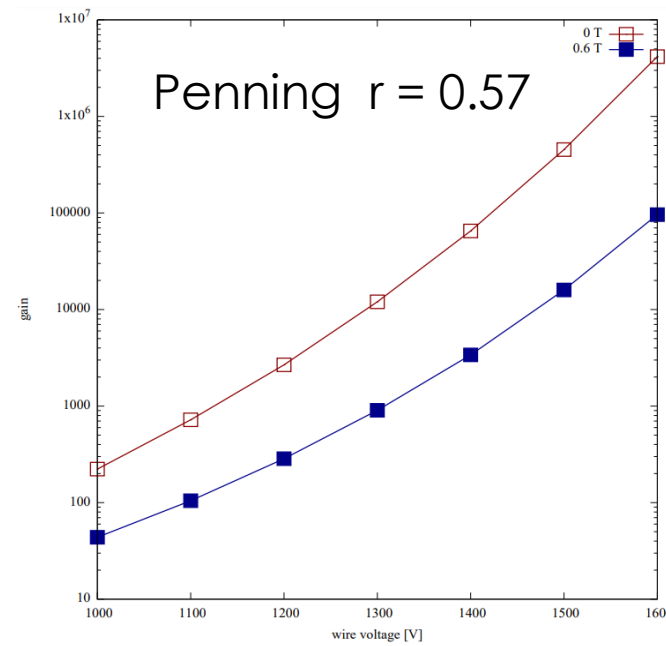
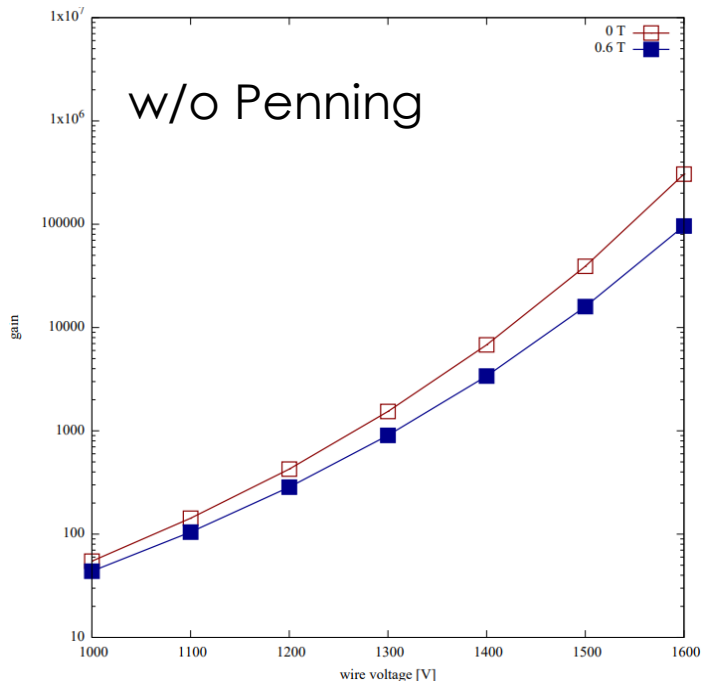


Figure 4-21 Gas gain in Ar/CO₂ 70/30 (experimental data and simulation).

Issues:



0
1 Gas gain

0 Signal different between
2 visualization and data output

0 Difference between signal
3 output after LTSpice
simulation

0 Comparing drift
4 path/time
distributions

0
5 TDR plots