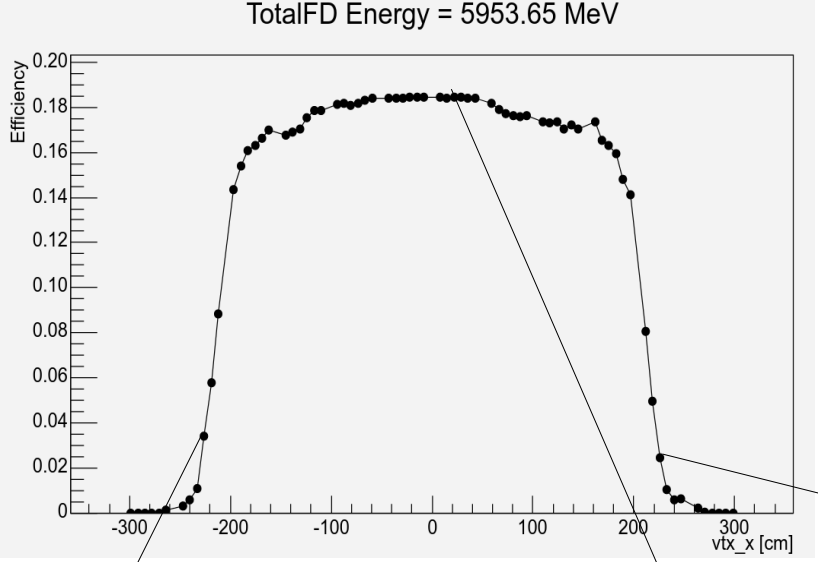
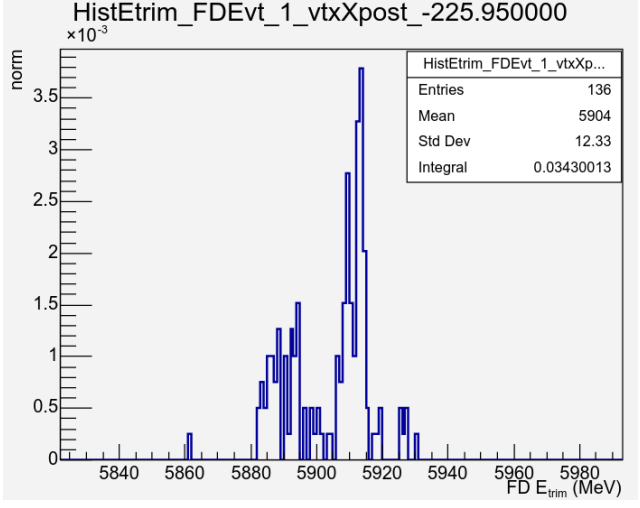
First Results: towards implementing the geometric efficiency correction withi PRISM

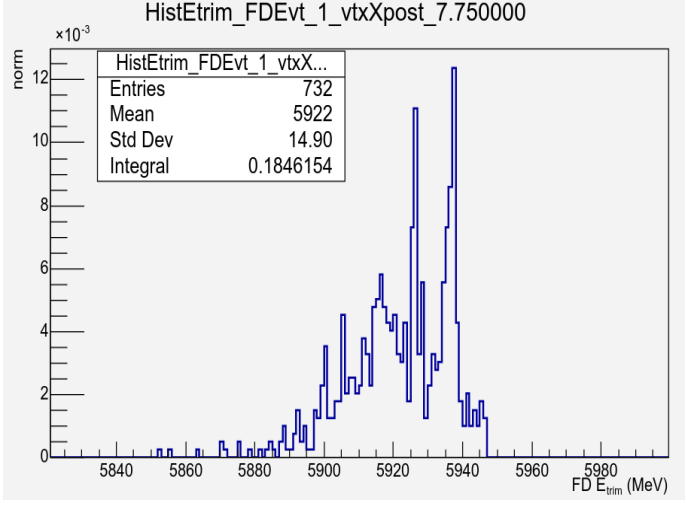
- first results: use all throws (4096) and keep / interested in events that passed the throw (vetoE < 30 MeV) vs Etrim
- all vtx_x position (72) that will be used in the geometric efficiency calculation
- first attempt to apply OA coefficients to Etrim distributions.. (still a lot to do and think of here)
-

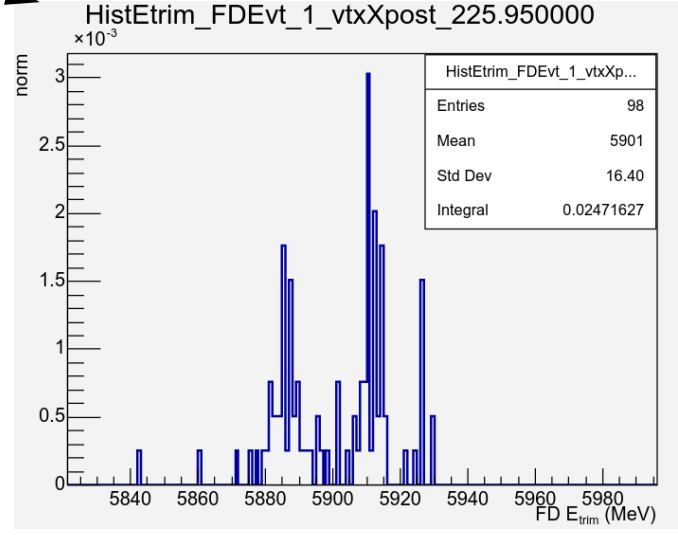


On-axis only : detector at 0 m

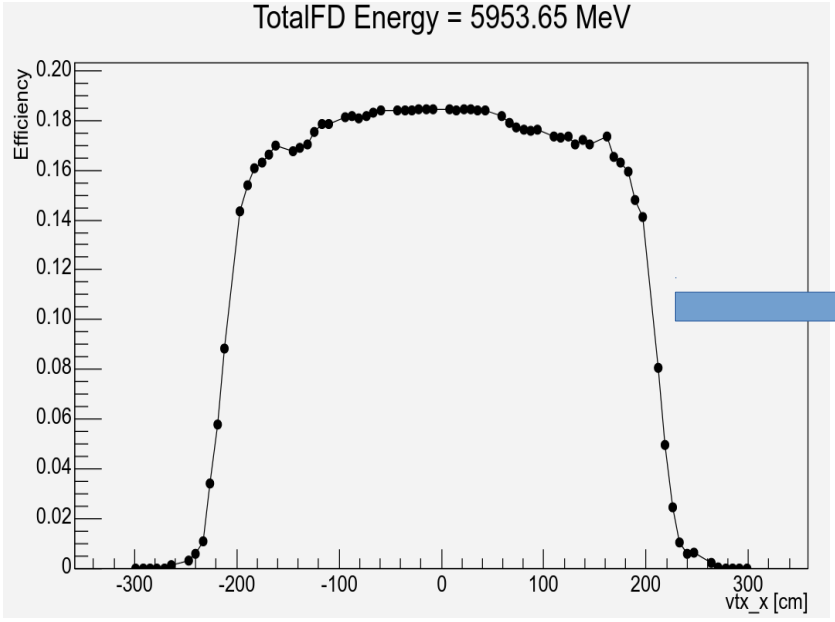
- from all throws we only care about throws passing the veto cut :
  Efficiency (vtx_x) = nThrowsPass / AllThrows
- Etrim: energy deposited inside ND active volume (= FD Energy – OutEnergy)
- Integral of each histogram corresponds to the efficiency at the given vtx_x position
- Entries = nThowsPass
  - **norm (y-axis) = Events * Eff / nThrowsPass**





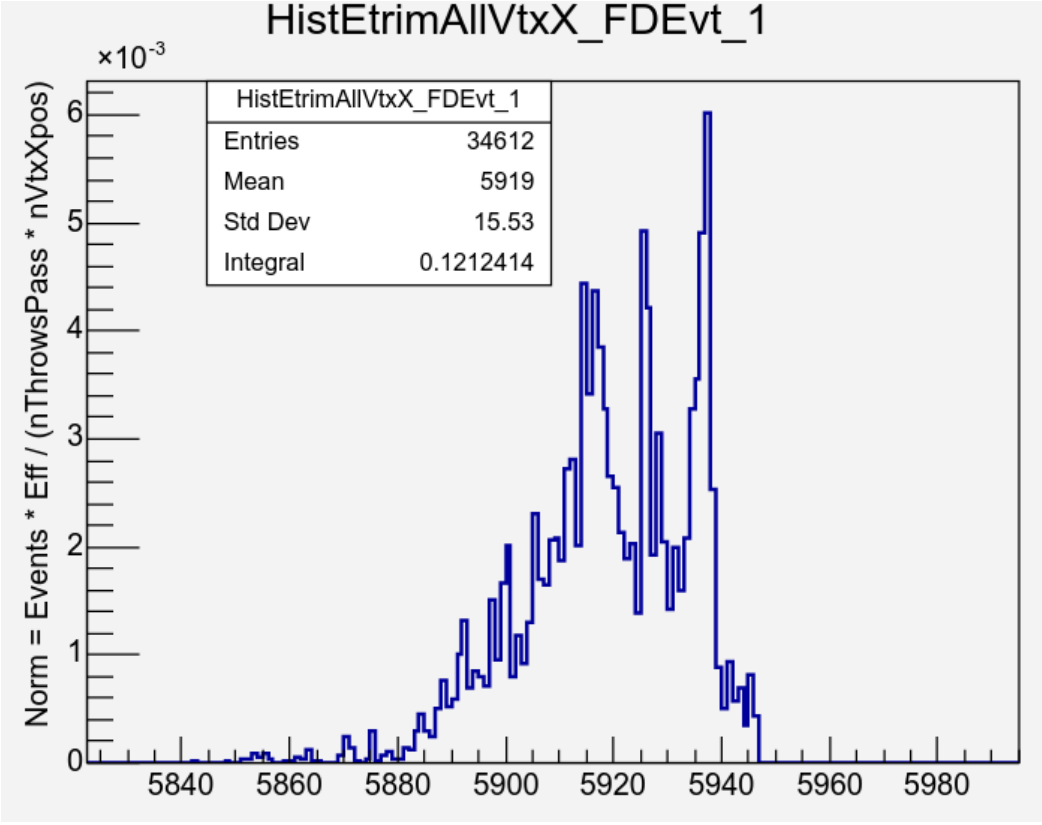


FD Events – efficiency corrected



add up all vtx_X Etrim histos (no coefficients applied)

Distribution of FD Event as seen by ND vs Etrim

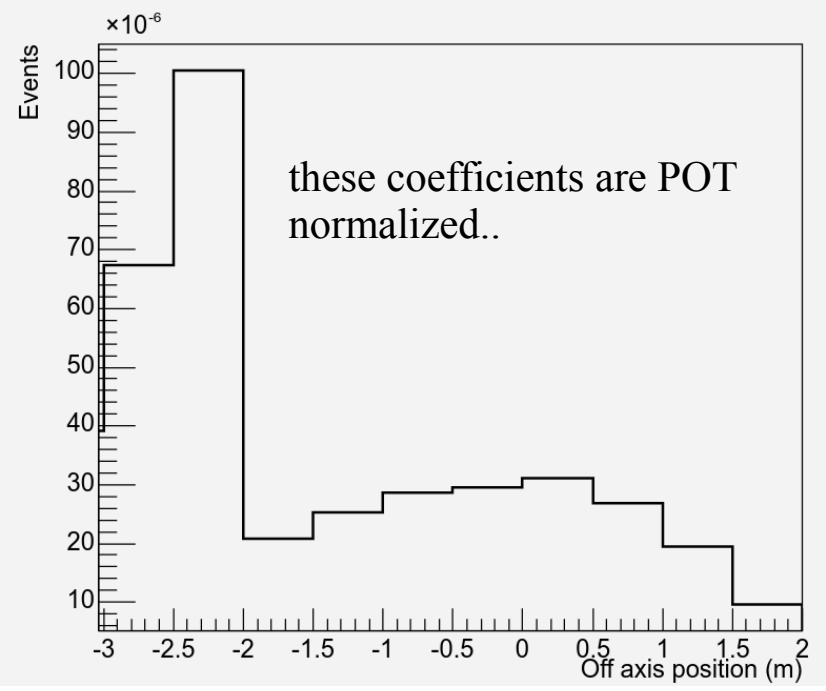


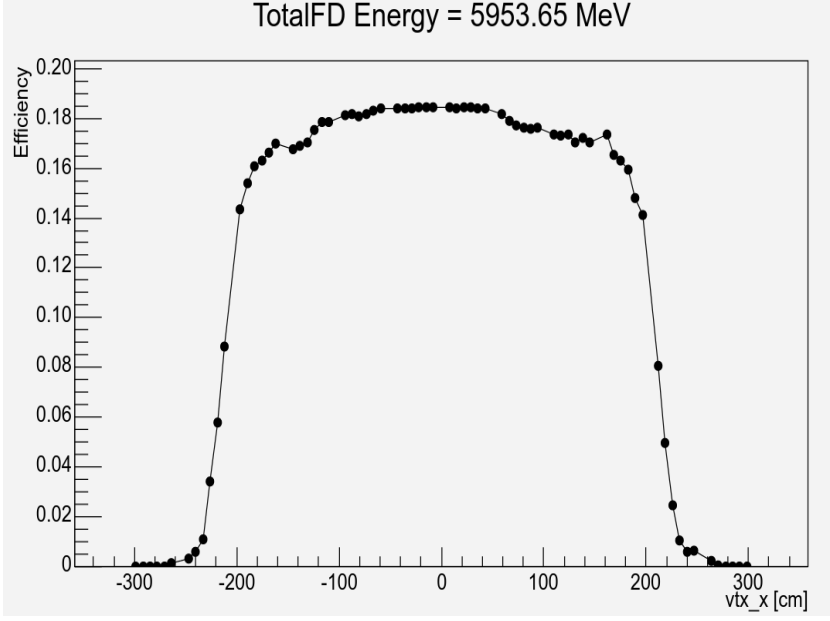
– **average efficiency** (E_{trim}) of FDEvt_1 (FD Energy = 5953.65 MeV) at ND is **0.12**

Apply coefficients to Etrim Distributions

- Get the final Etrim histo by applying the coefficients to each vtx_x Etrim histo: HistEtrimFinal = Sum_OA (HistEtrim(OA) * Coef(OA))

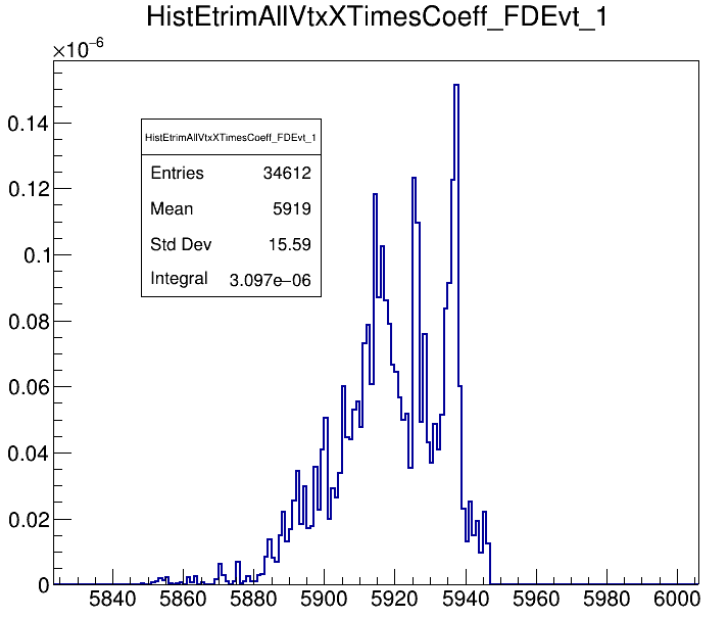
  OA Position = vtx_x + det_x → det_x = 0 (for now only On Axis)

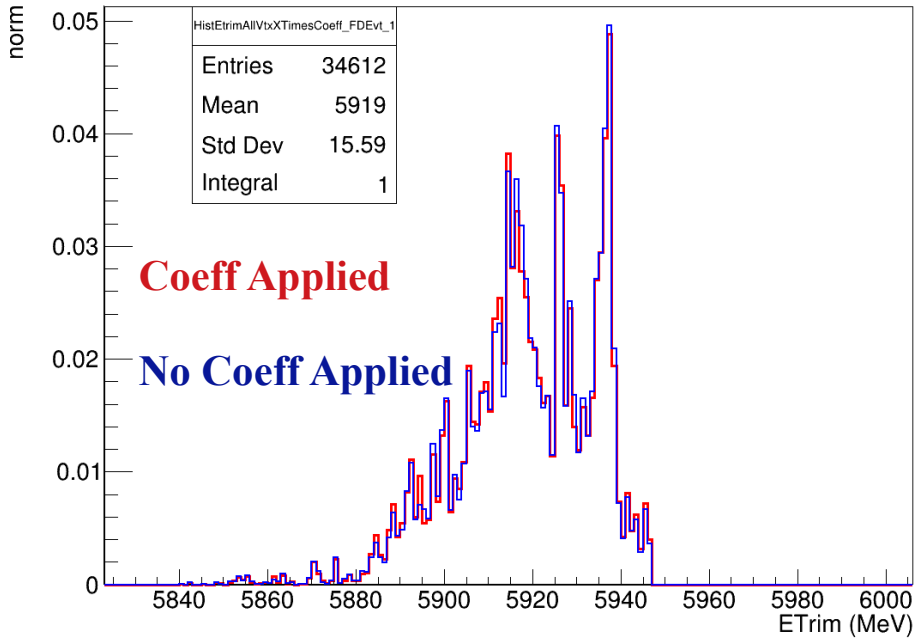




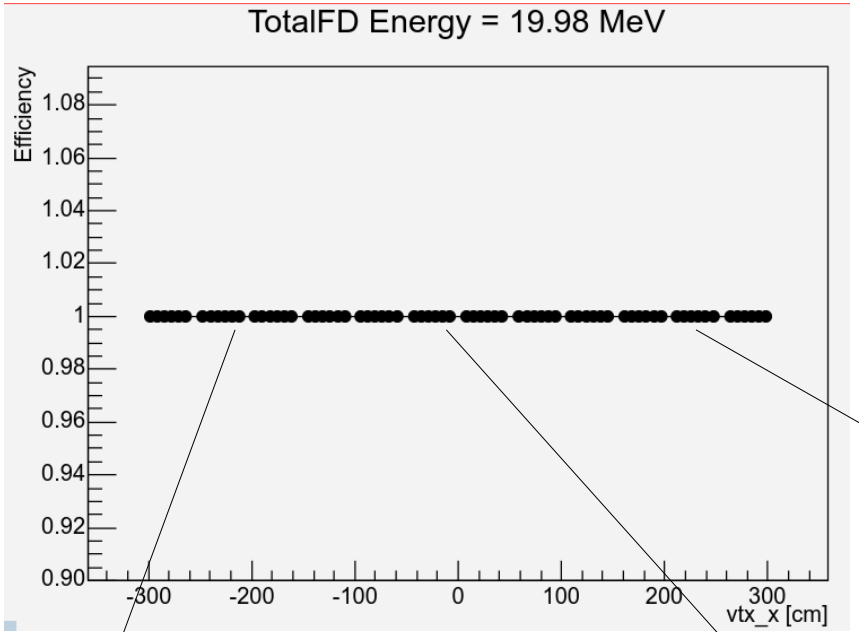
– not same binning yet but … can try to roughly mimic this for now

FD Events – efficiency corrected + apply coefficients



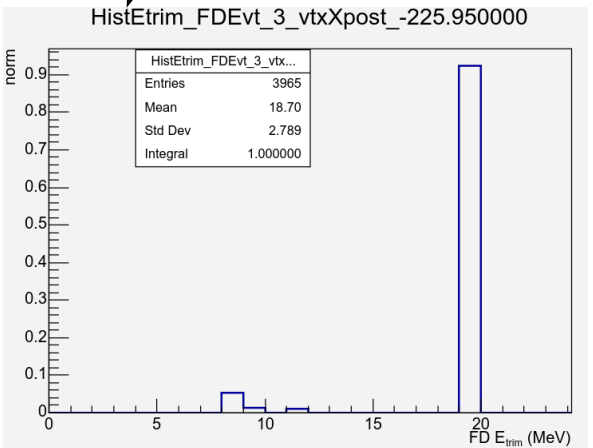


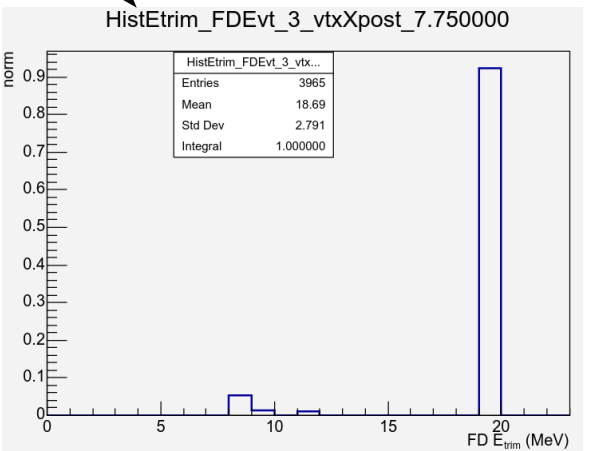
- integral is now not equal to the average efficiency anymore..I guess we still want this to be the case right?
  - probably first TODO will be getting the coefficients without any POT scaling ...

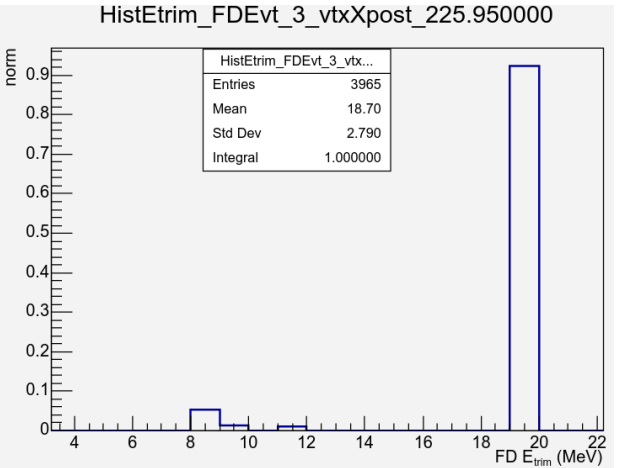


On-axis only : detector at 0 m

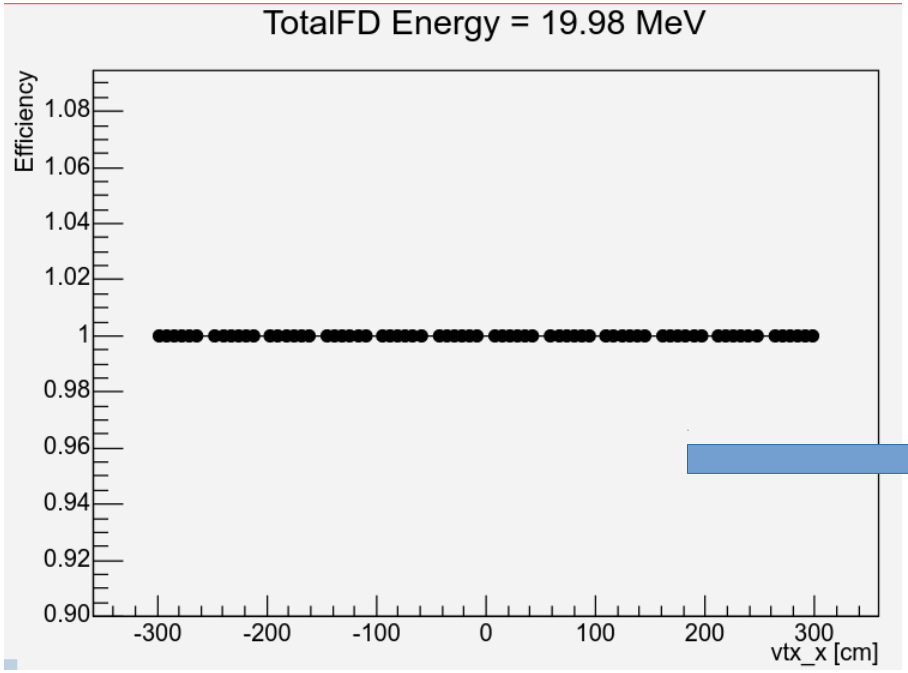
- from all throws we only care about throws passing the veto cut :
  Efficiency (vtx_x) = nThrowsPass / AllThrows
- Etrim: energy deposited inside ND active volume (= FD Energy – OutEnergy)
- Integral of each histogram corresponds to the efficiency at the given vtx_x position
- Entries = nThowsPass
  – norm (y-axis) = Entries * Eff / nThrowsPass



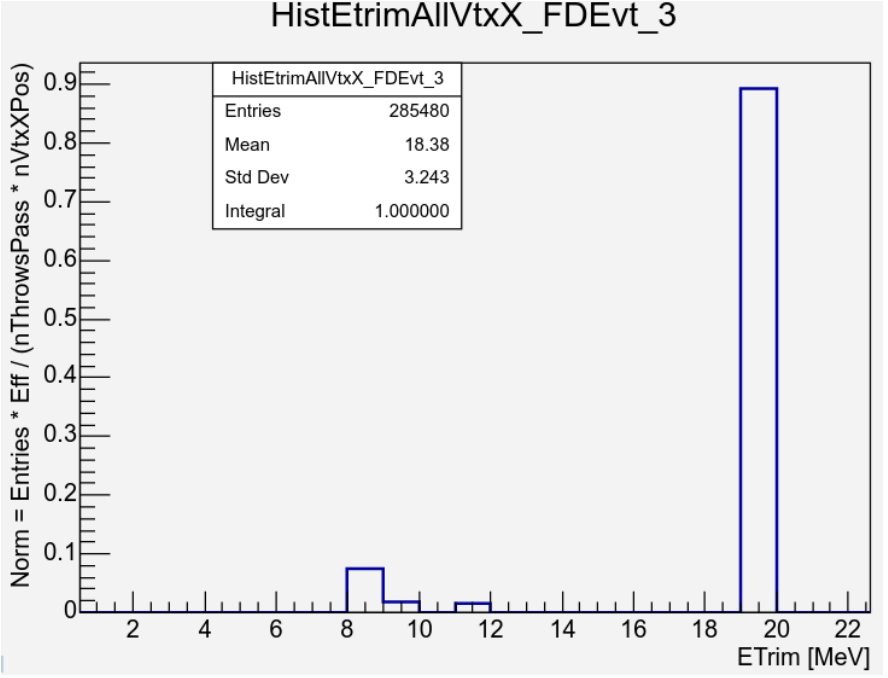




FD Events – efficiency corrected



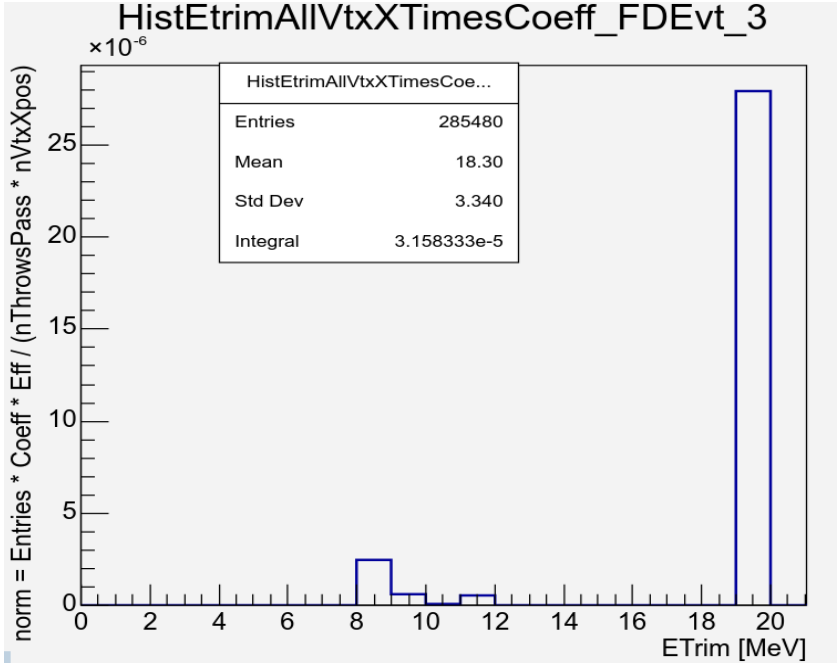
Distribution of FD Event as seen by ND vs Etrim

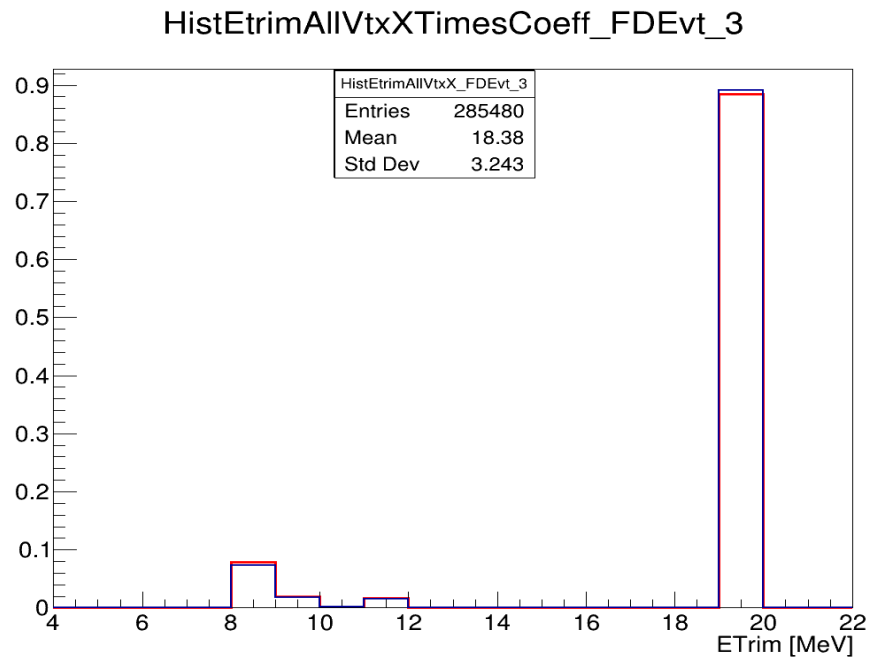


add up all vtx_X Etrim histos (no coefficients applied)

– **average efficiency** (E_{trim}) of FDEvt_3 (FD Energy = 19.98 MeV) at ND is **1**

FD Events – efficiency corrected + apply coefficients





- integral is now not equal to the average efficiency anymore..I guess we still want this to be the case right?
  - probably first TODO will be getting the coefficients without any POT scaling ...

Where we are:

- we can now get Etrim histos for all throws that pass the veto cut directly from the geoEff code
- need to figure out what to do with the coefficients..what would the integral of "linearly combined ==sum_vtxX [HistoEtrim(vtx_x) * OACoeff(vtx_x)] be? – probably need to have the same integral as before (I.e the "average efficiency") but with different shape due to coefficients..?
  – should be solved soon

TO DOs

- look at more events and try to compare efficiencies for different OA postions → find a way to extrapolate between on-axis to any off-axis position
  - only have in the end the Etrim histos for on-axis + extrapolation function for each of them at different off-axis positions for any vtx_x