# Analysis Updates

Cameron Bravo (SLAC)

Current 2019 Reco

- Reconstructed 2019 data

  - Master branch up to hash 47712878302

  - HPS_PhysicsRun2019-v2-FEE-Pass0

  - All sample partitions, about 125 million events

- Will discuss needs of analysis group more after some plots

- This is meant to be a preliminary look because people kept asking for these plots towards the end of last year

  - Trying to look for some insight into what could be going on with the alignment and inspire some next steps there
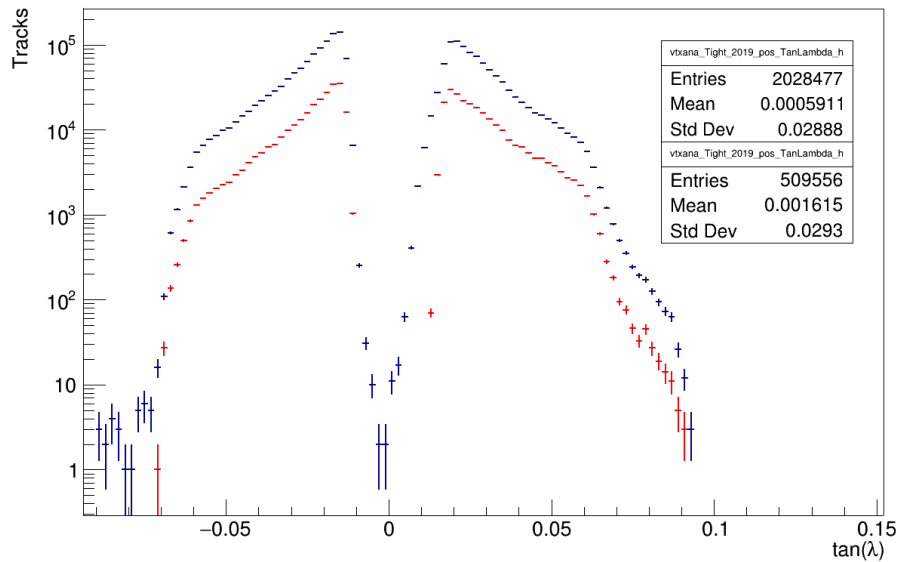
Cutflow

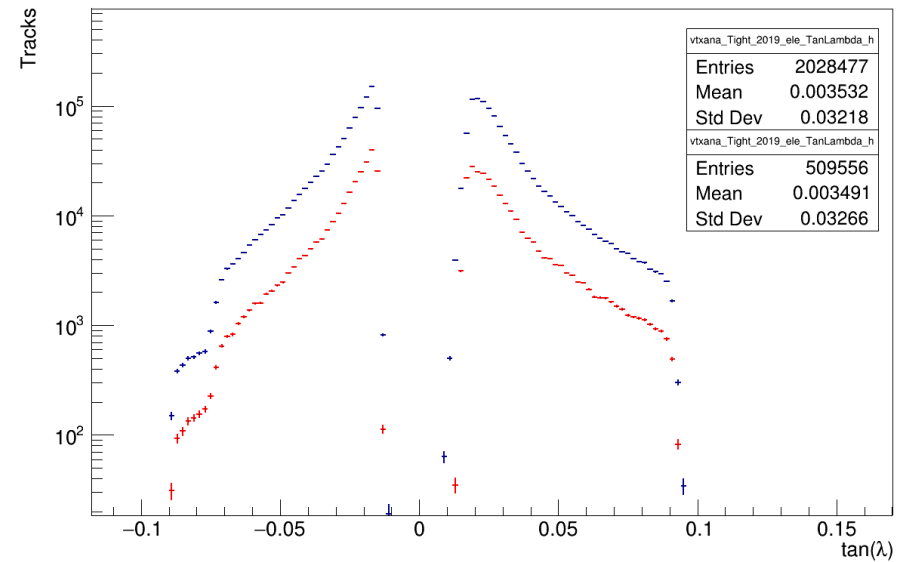vtxana_vtxSelection_cutflow

vtxana_Tight_2019_cutflow
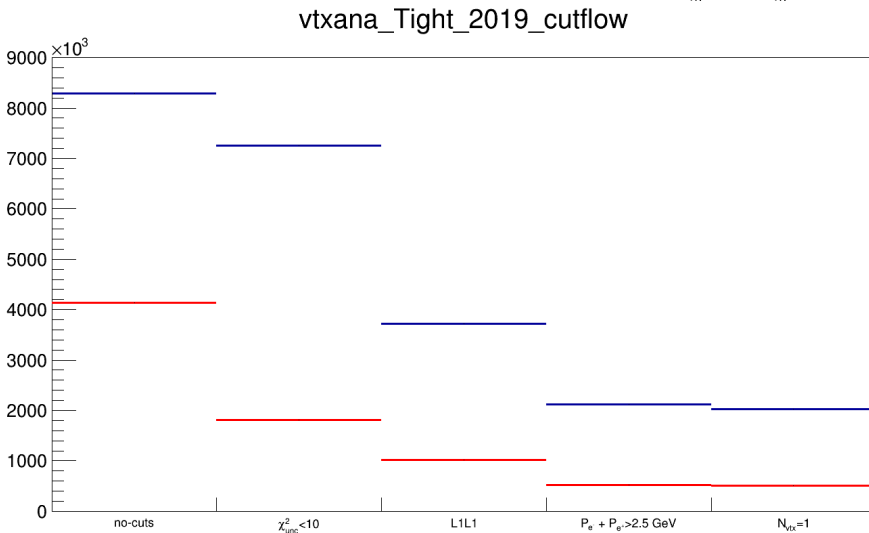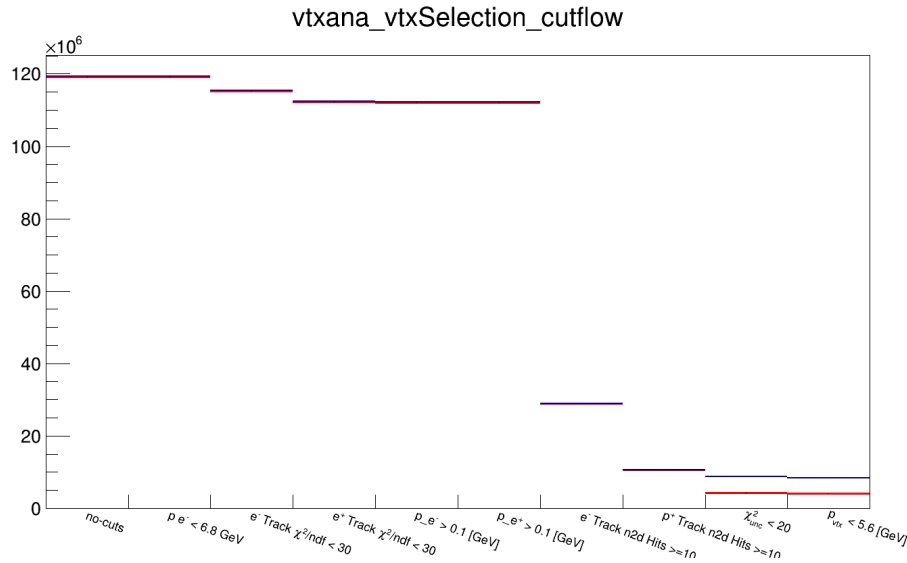
- Constrained vertices in red and unconstrained are in blue

- Top is preselection

- Bottom is "Tight" selection

- Less constrained vertices due to combination of state of alignment and vtx chi^2 cut
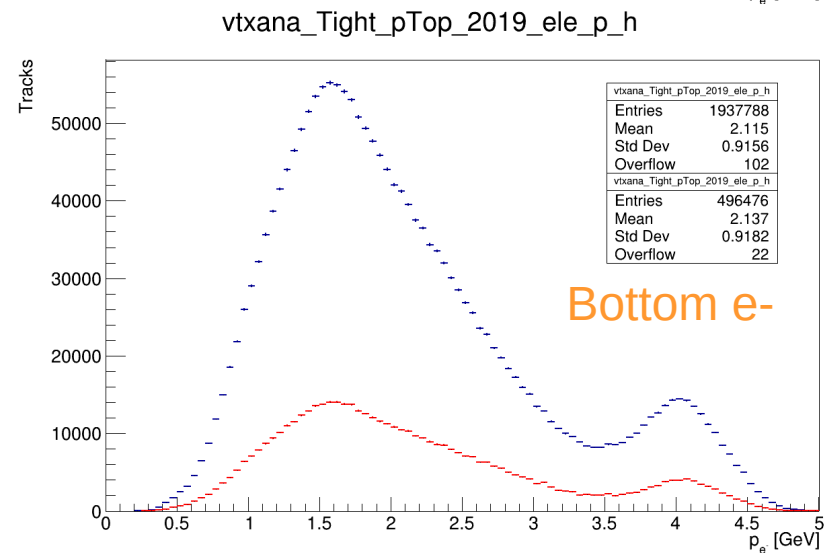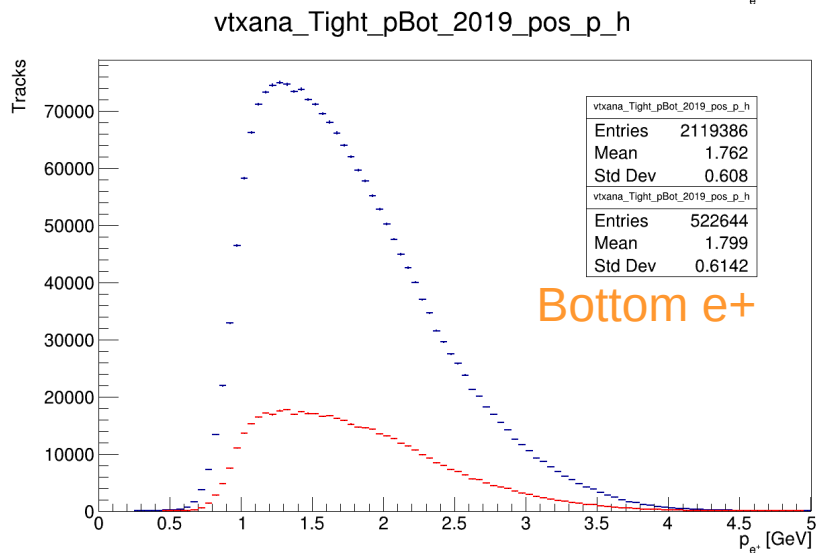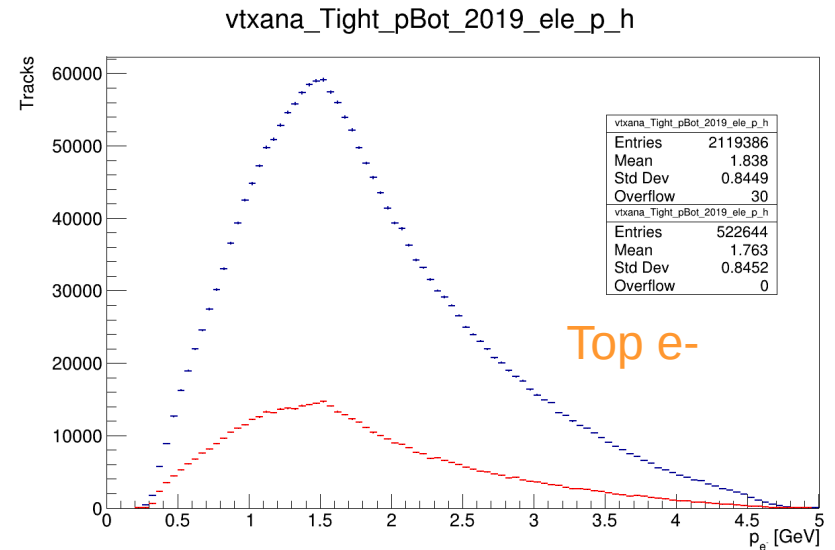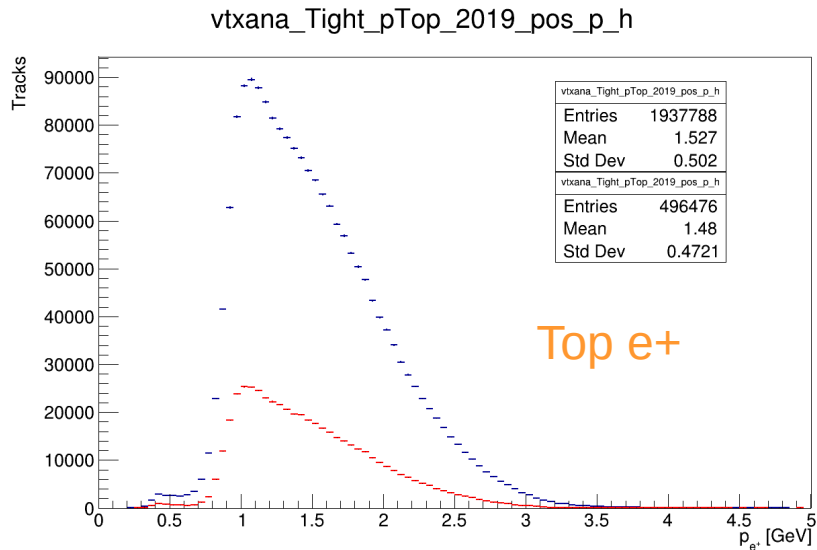
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Track Tan(Lambda)

vtxana_Tight_2019_pos_TanLambda_h
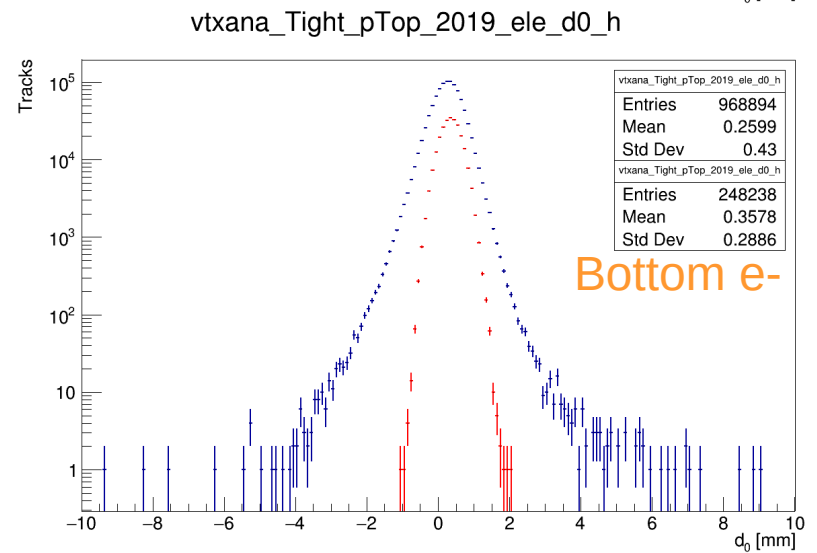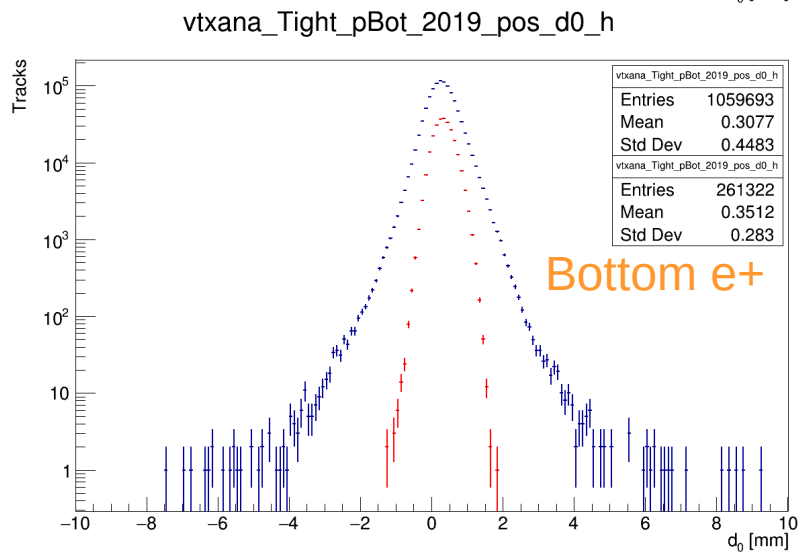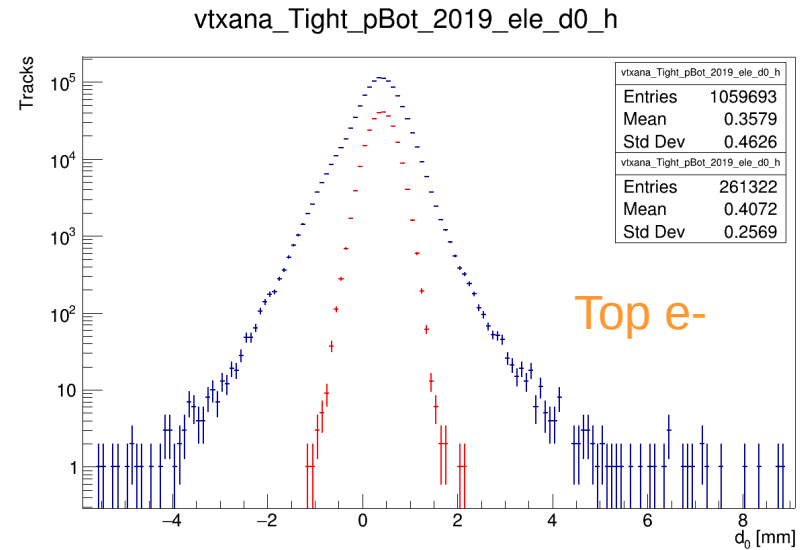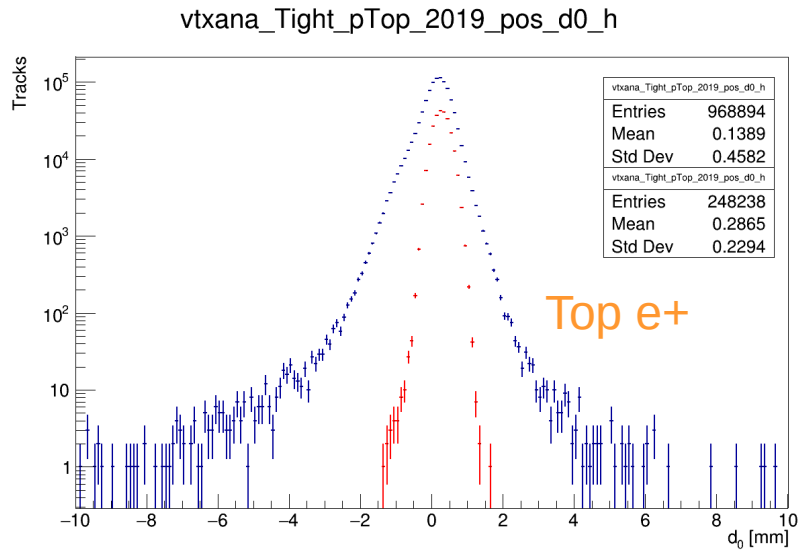
vtxana_Tight_2019_ele_TanLambda_h

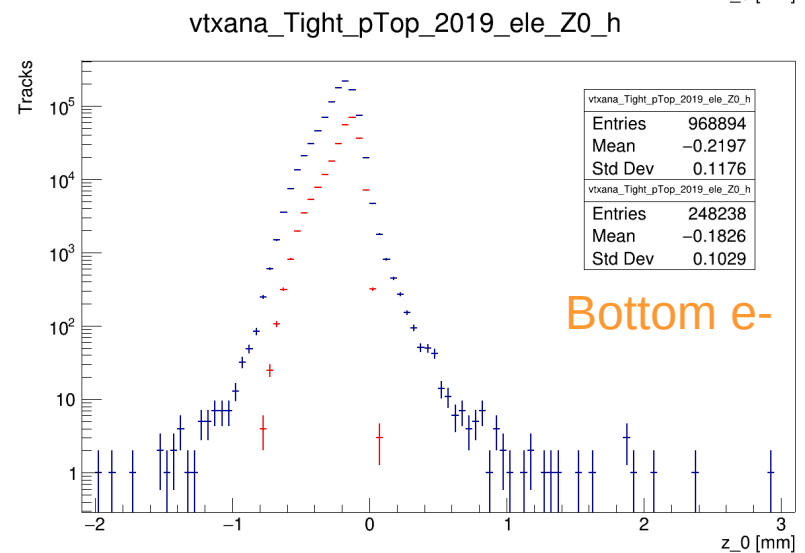- Red are tracks in constrained vtx

- Blue are tracks in unconstrained vtx

Track Momenta

Track d$_0$

vtxana_Tight_pTop_2019_pos_d0_h

vtxana_Tight_pBot_2019_ele_d0_h

vtxana_Tight_pBot_2019_pos_d0_h

vtxana_Tight_pTop_2019_ele_d0_h

Top e+

Top e-

Bottom e+

Bottom e-

Track d$_0$
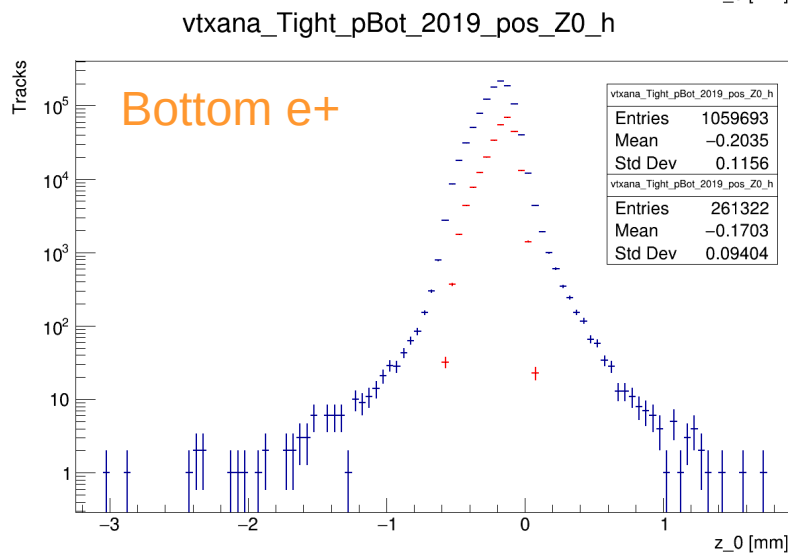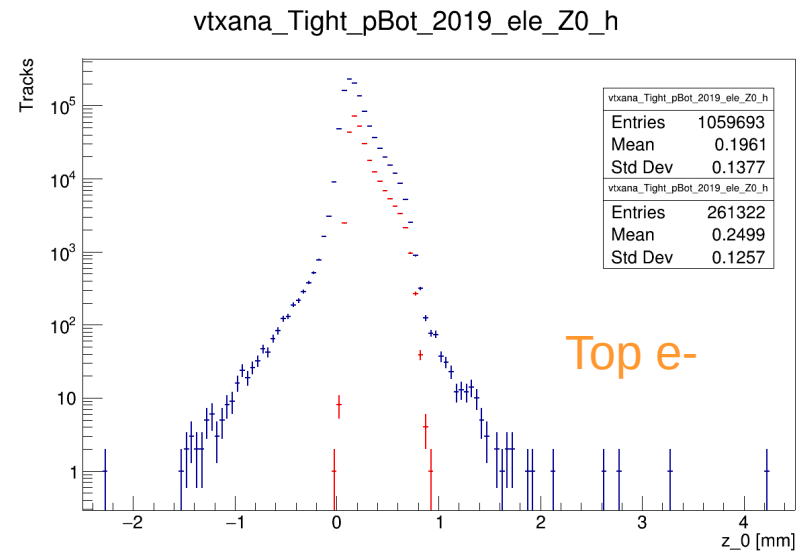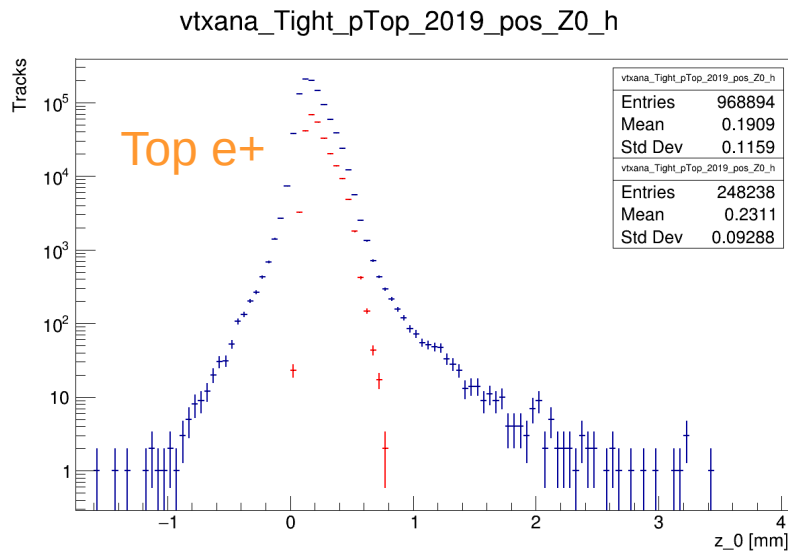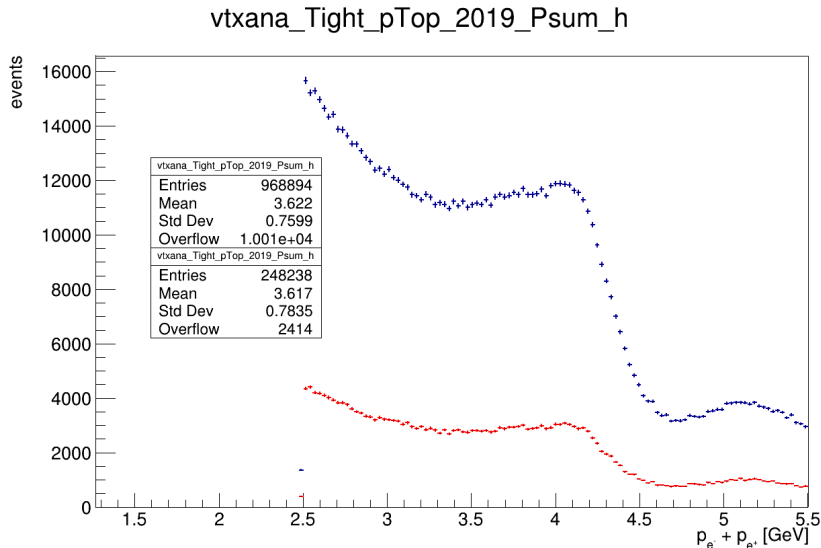
Cutflow

- No FEE tracks on top vtx

- Vtx with positron in bottom have both tracks with clearly too high momentum scale

- Vtx with positron in top have peak a bit higher than beam energy

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- Blue are vtx with positron in the top, red the positron is in the bottom

- Vtx z distribution more symmetric for vtx with positron in bottom

Analysis Needs

- Aligned geometry for 2019 and 2021 detectors
    - This is the top priority at the moment by a lot
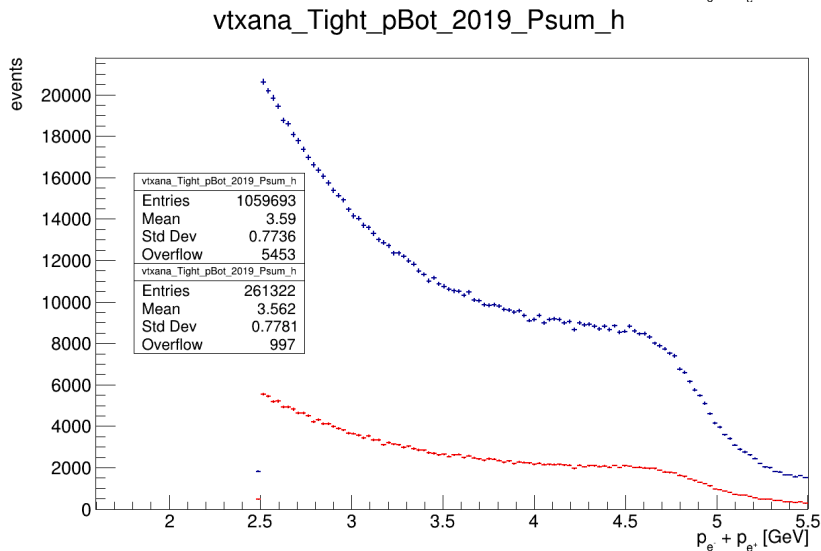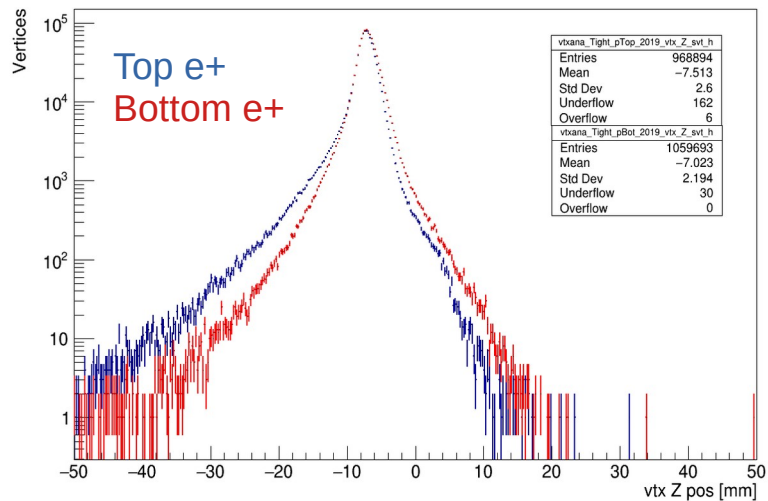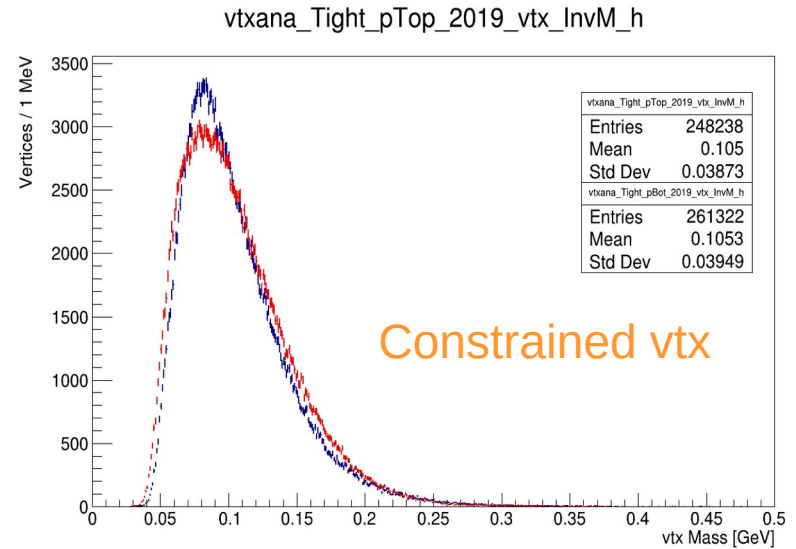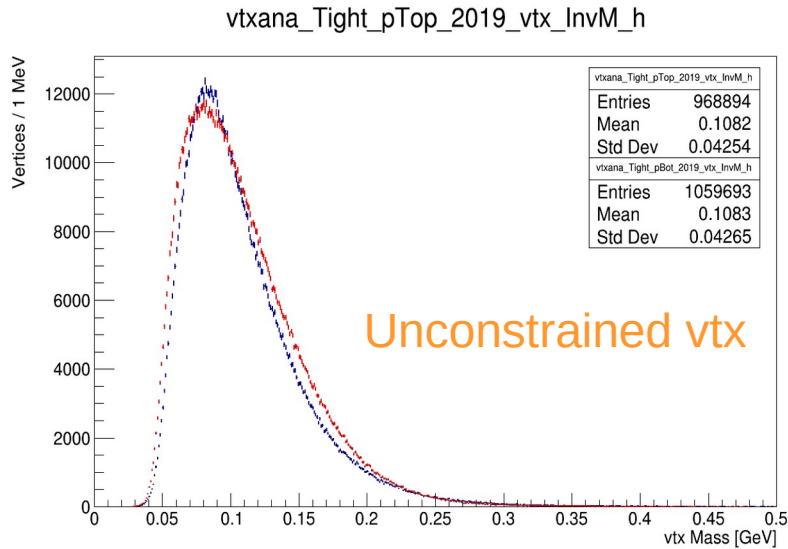   - Not a trivial thing to do, PF leading the charge

- Merge DQM software improvements for 2021 run
    - Work done by Matt G has yet to be merged

- Merge Run2021 branch
    - Needs small fix PF promised, done yet?
    - I run all three years reco at least once per week

- Calibrated Ecal for 2021
    - Andrea has been pushing on this recently

Analysis Plans and Discussion

- Snowmass estimates for new physics beyond A'

    - ALPs, SIMPs, iDM are the three main signals we want to study as of now

    - Planning to meet with Phillip and Natalia soon on this

- Keep an eye on key analysis plots as geometry progresses

- Alignment work is priority now

    - Analysis group members focusing on this in near future

- Searching for SIMPs in 2016 data

    - Alic is proposing to work on this analysis for his thesis

    - Another iteration on alignment?

    - MC needs to study tritrig madgraph cuts and ensure we have all of the low Psum region for this analysis