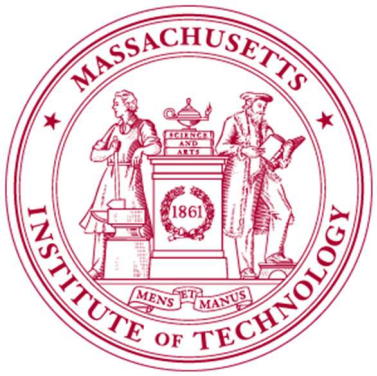
CLAS12 Deeply Virtual π^0 Production Analysis Update

MIT-Uconn CLAS12 Analysis Workshop



Bobby Johnston

2:00 PM Friday, September 6 2019

Topics

- Work overview
  - Current work flow
  - Example pion plots
- Details of Current Progress
  - Work on proton pID
- Path Forward

Overview

For reference, data shown in this presentation is from run 5039:
/volatile/clas12/rg-a/production/recon/pass1/dst/v2/005039/dst_clas_005039.evio.00*

Current workflow:

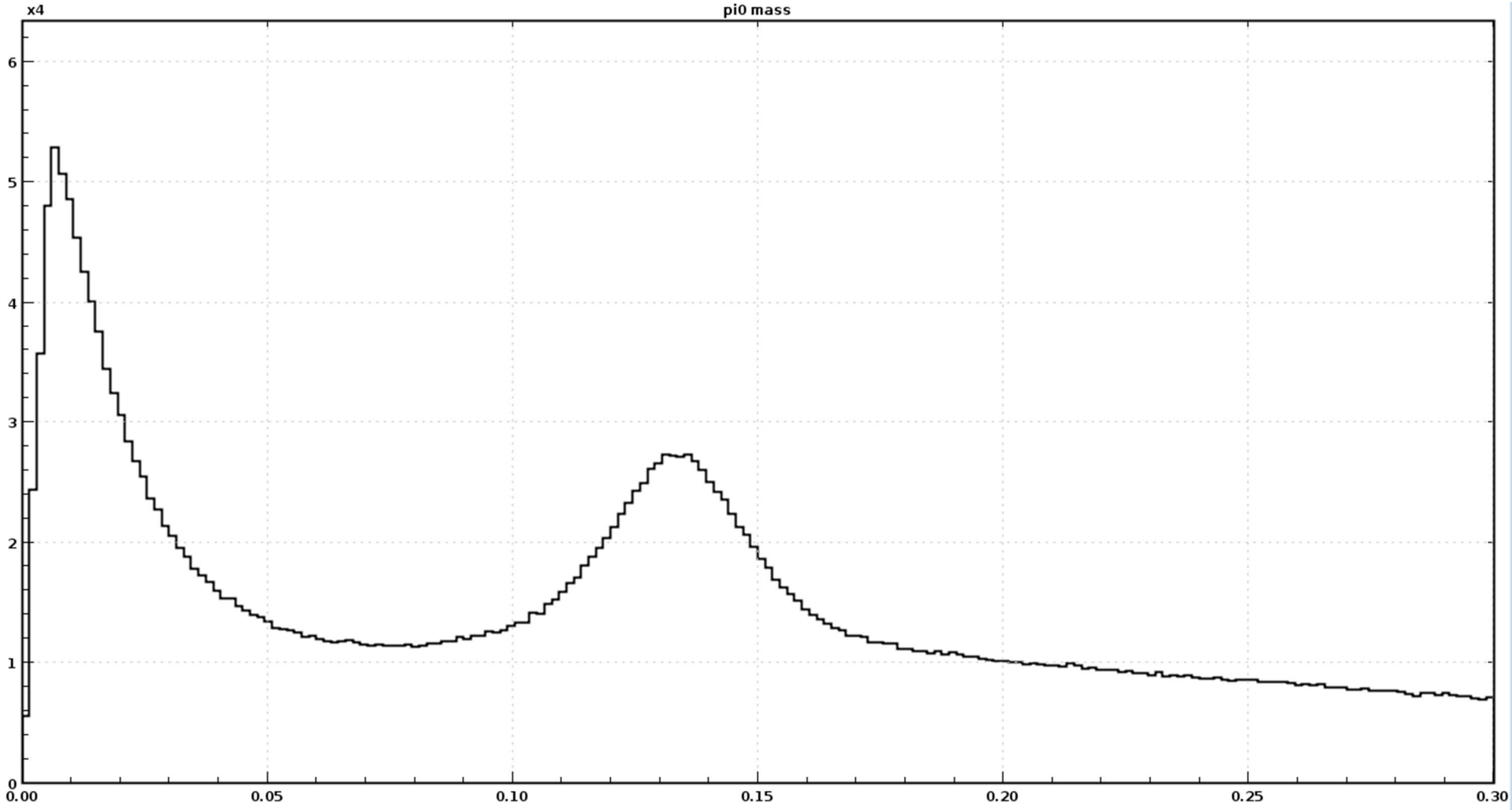
Groovy → hipo2root → ROOT (pyroot)

- Faster to write than Java
- Allows for natural use of CLAS12 software
- Code prototyping

- Fit histograms created from converter
- More options avaliable and more user experience (python, ROOT)

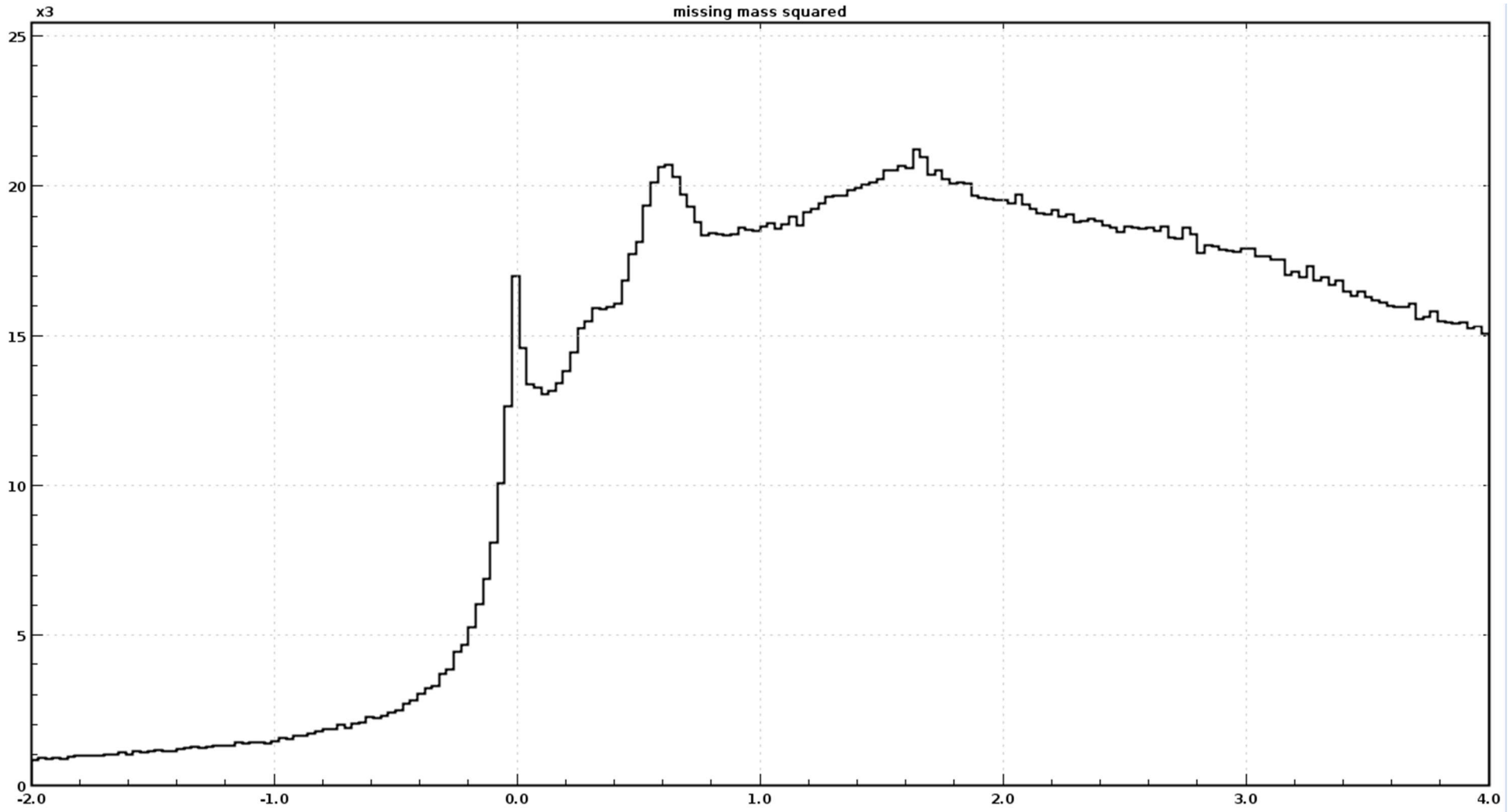
Example – pion mass from epγγ events

- Basic example – reconstruct mass from γγ pair
- Using particle banks reconstruction values for everything, no further analysis here
- Code credit to Andrey Kim --- data from runs 5040-49



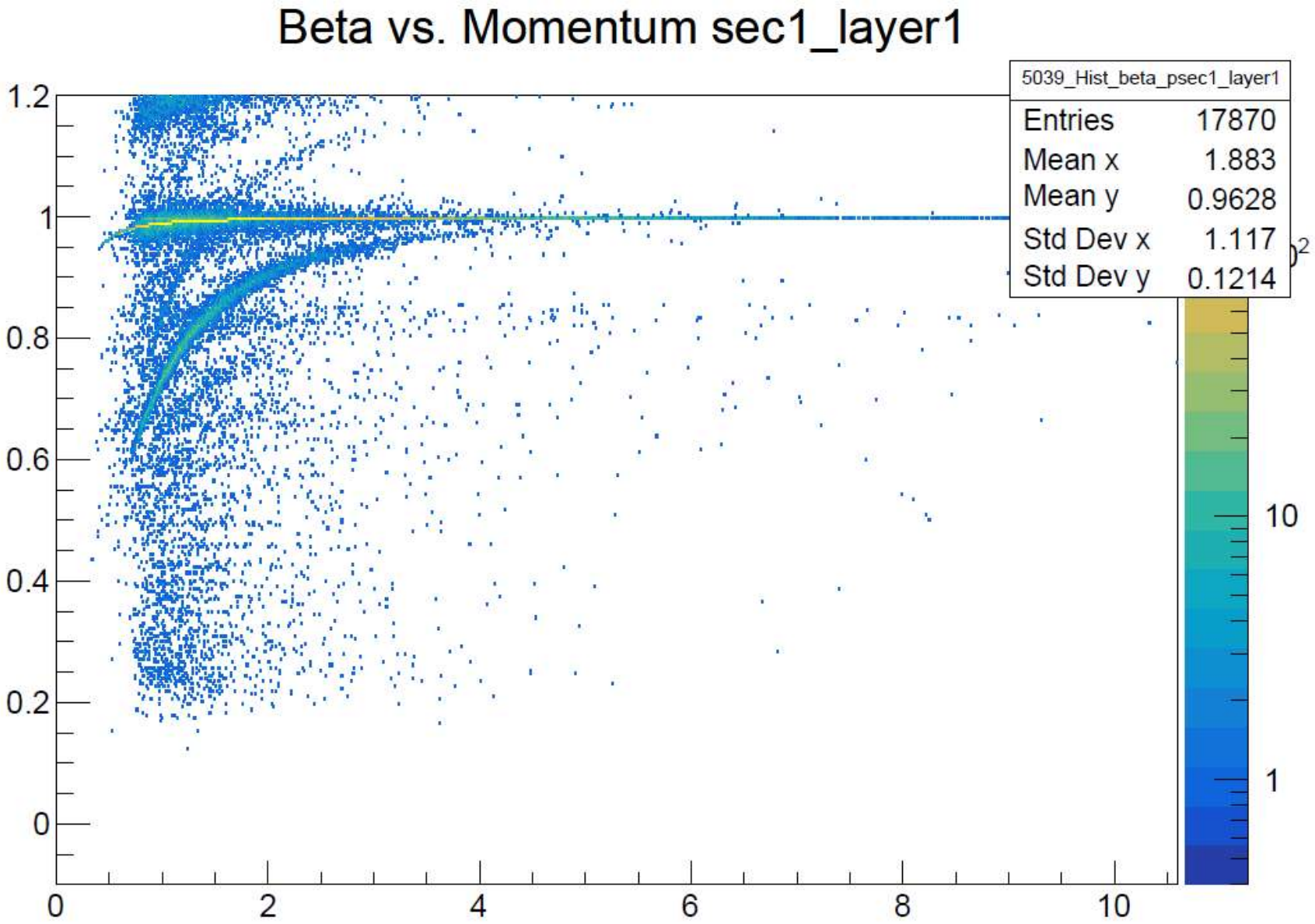
Example – missing mass from epγγ events

- Basic example – missing mass from electron/proton
- Using particle banks reconstruction values for everything, no further analysis here
- Code credit to Andrey Kim--- data from runs 5040-49



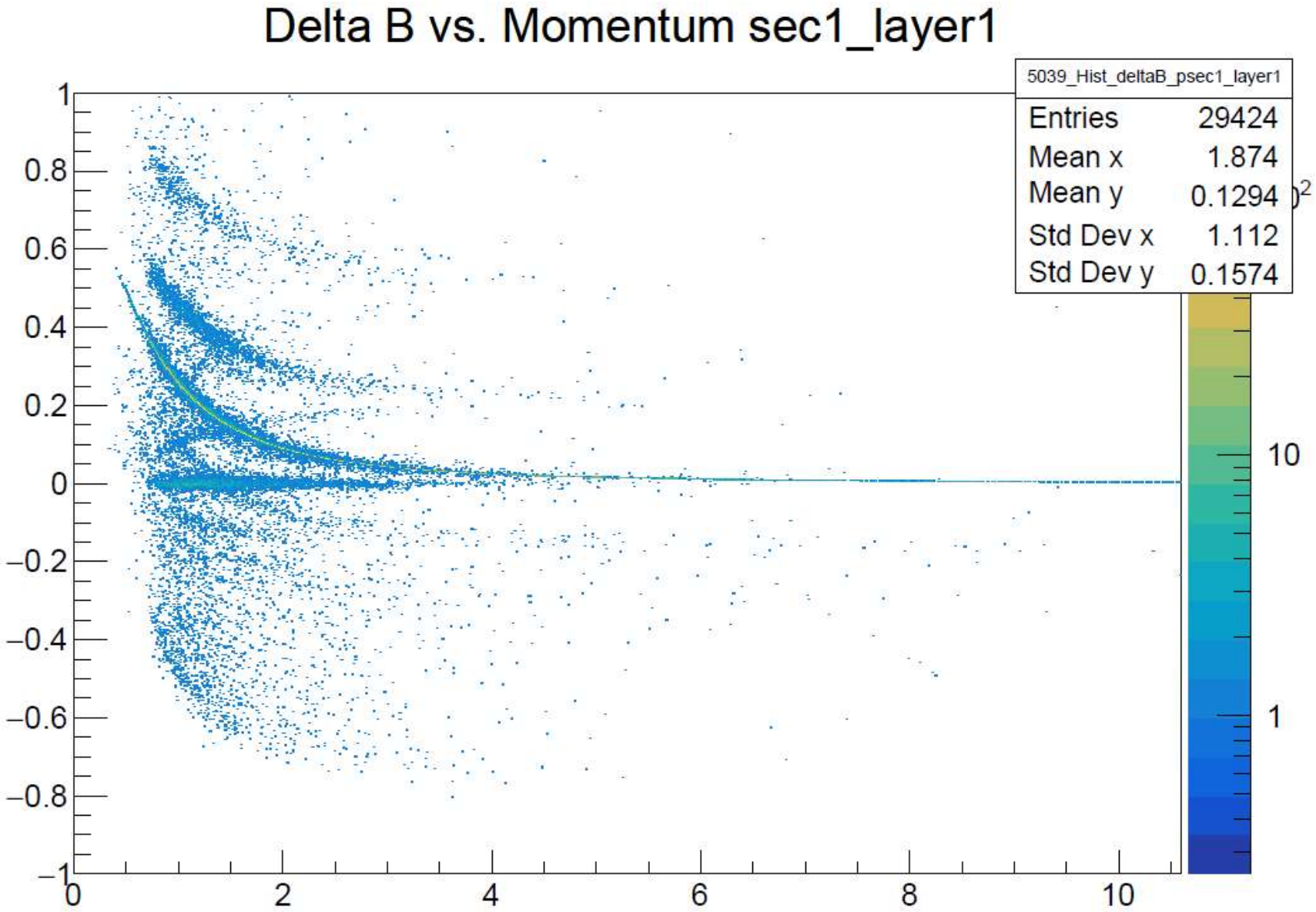
Current Work – Proton PID

- Shown here: postive particle, event start time >0, hit in FTOF



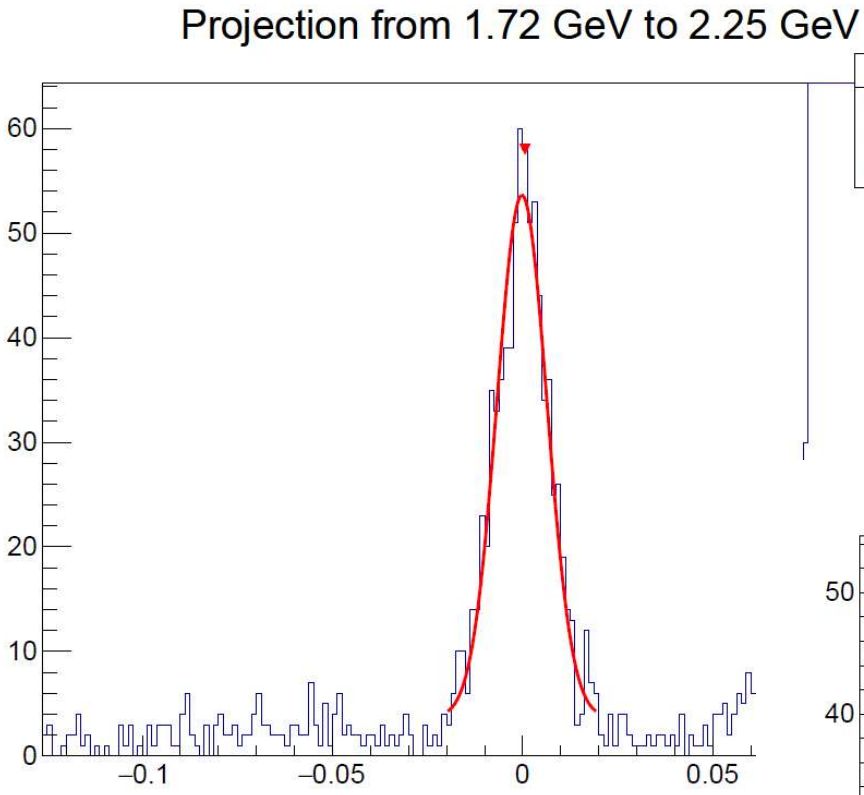
Proton PID - Δβ vs. p

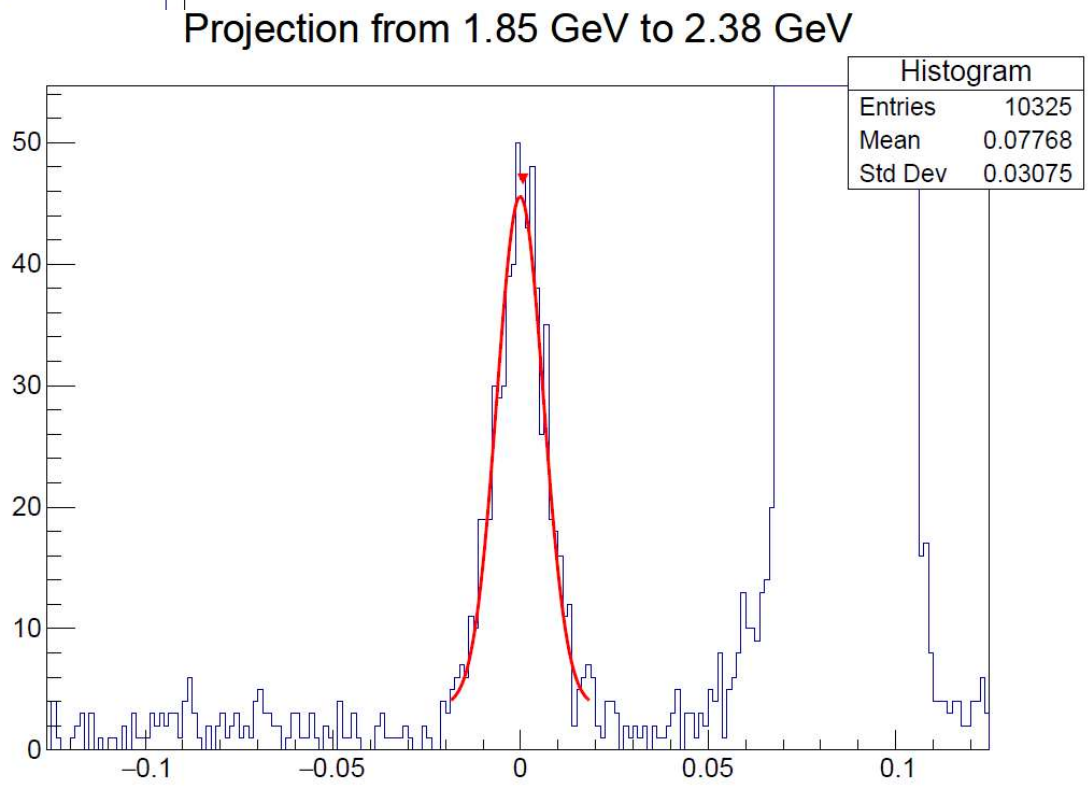
- Assume particle is a proton, calculate β from reconstructed momentum
- Compare calculated β to reconstruced β value, compare as function of momentum



Proton PID – Fit Gaussians on Slices

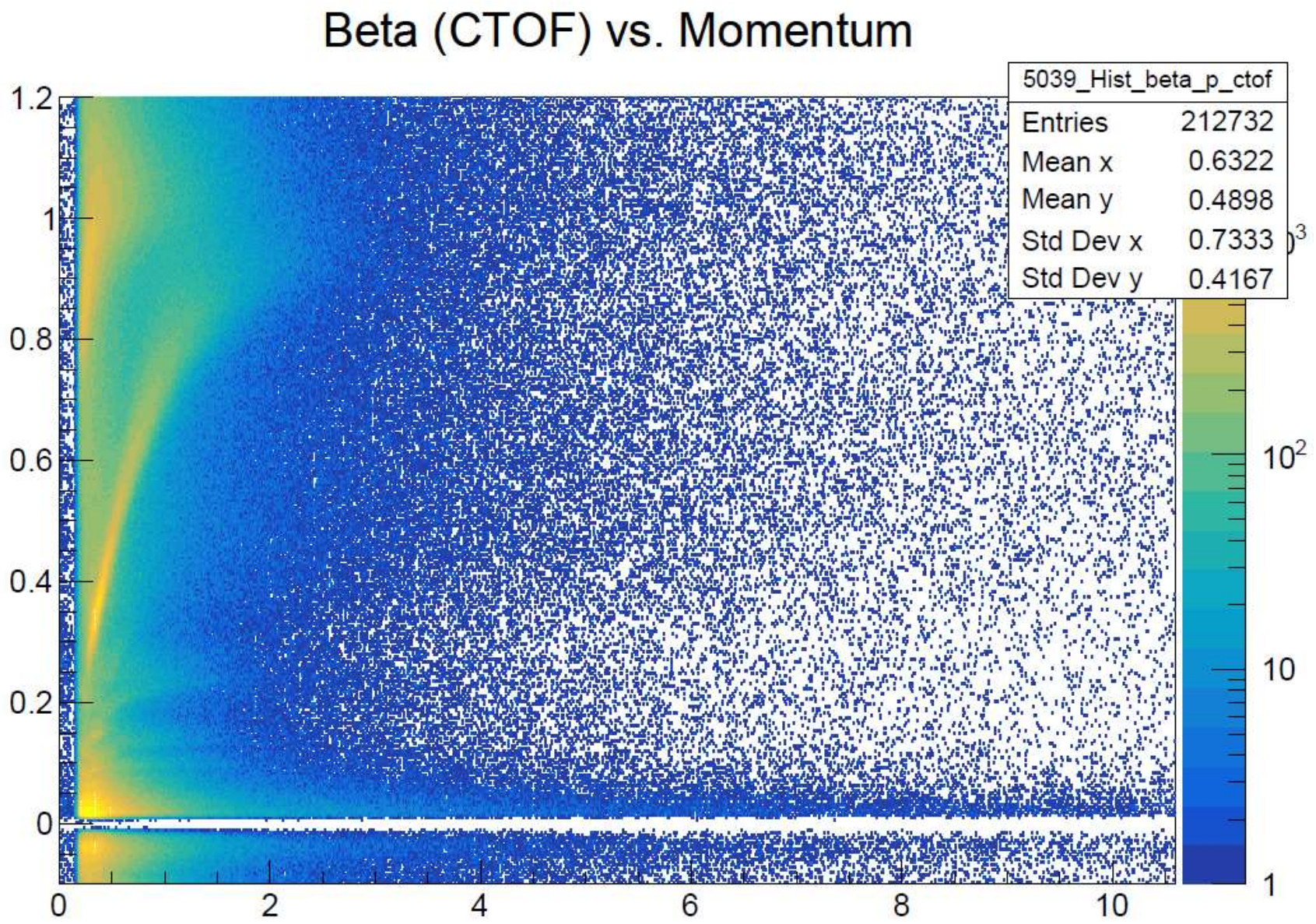
- Take slices in momentum of Δβ vs. p, fit gassian, use 3σ for proton pID cut





Proton PID – Looking at CTOF

- Can repeat procedure using CTOF, currently working on this, seems to be issues

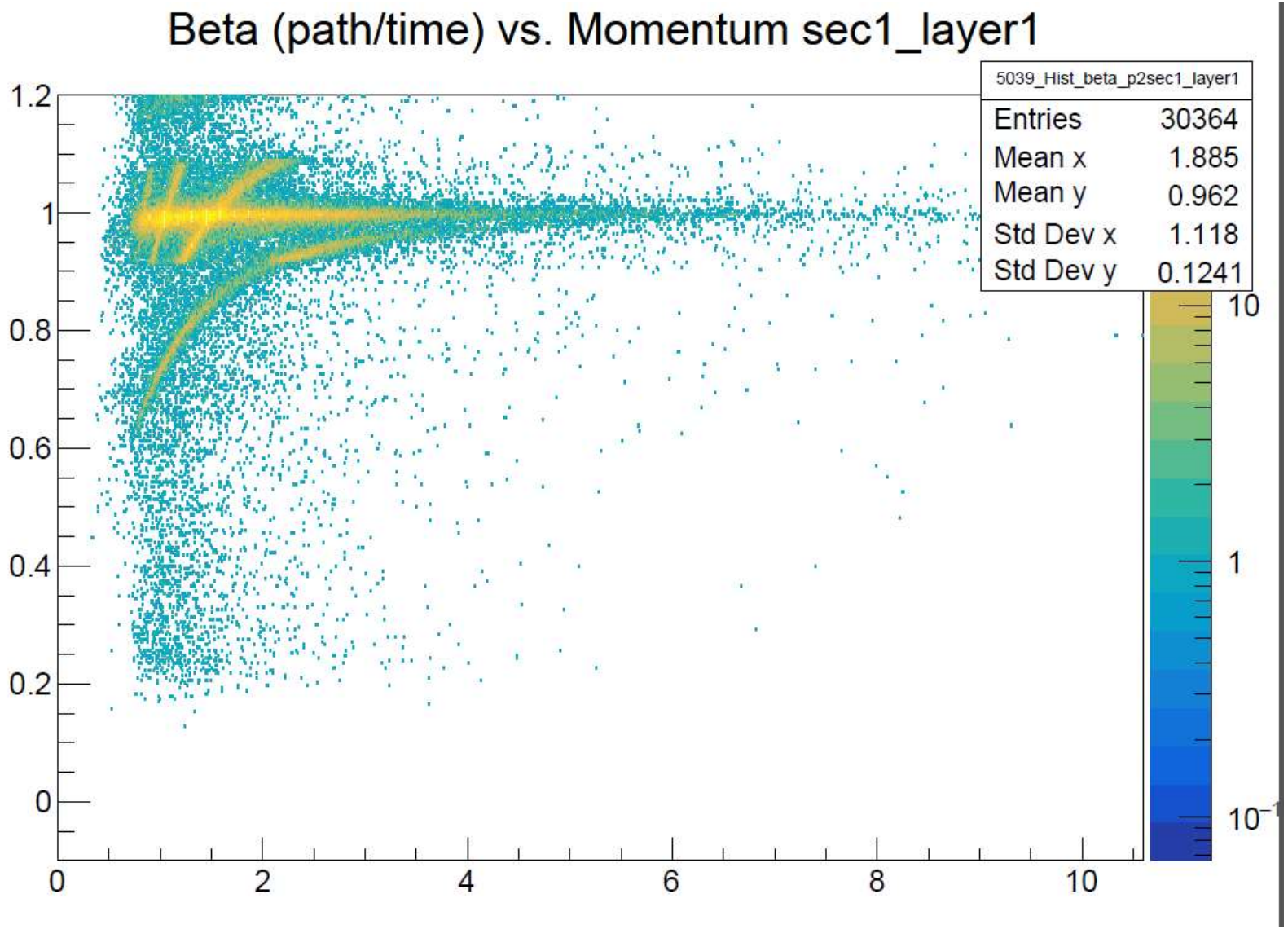


Path Forward

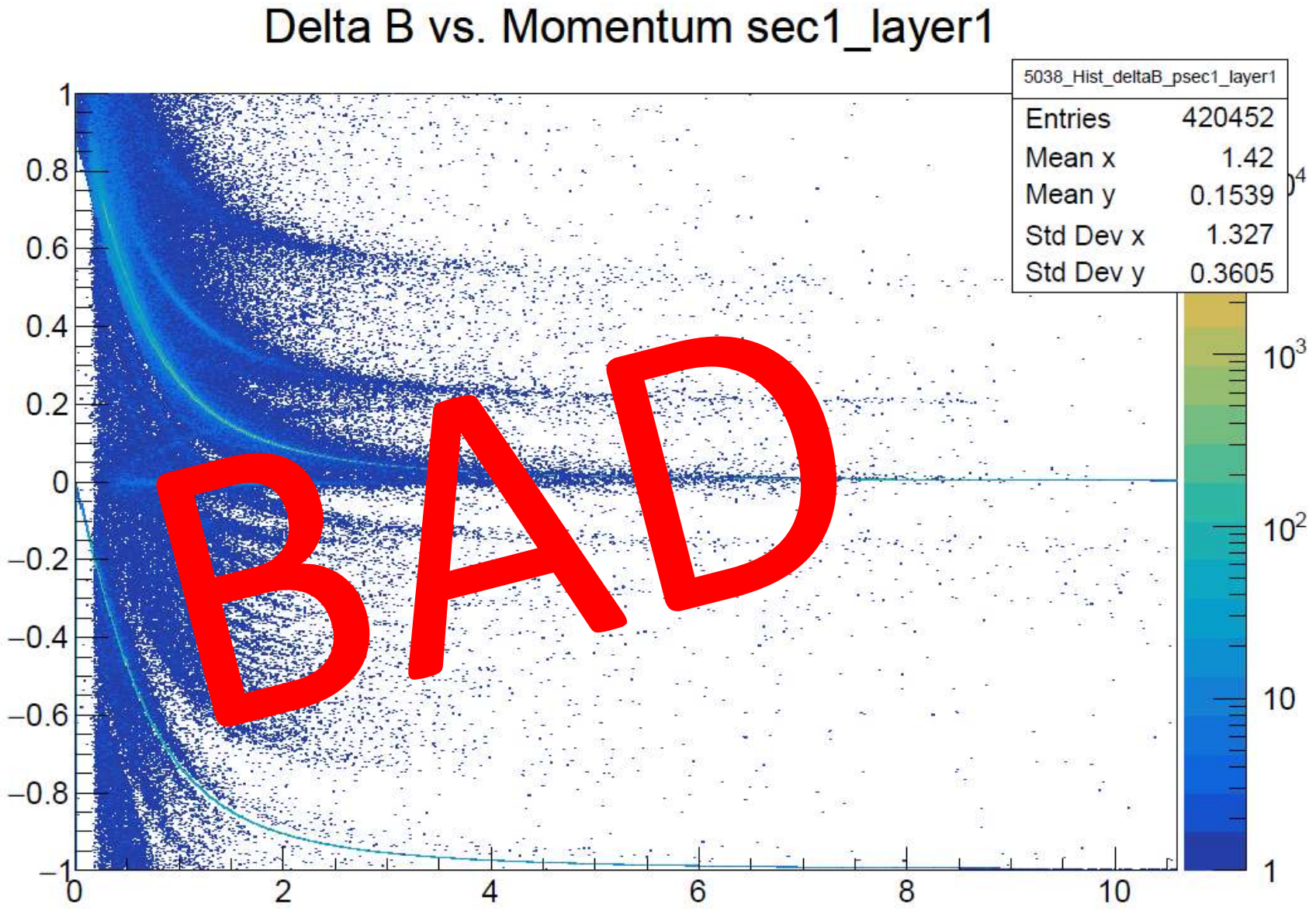
- Continue to resolve issues with proton pID cuts
- Combine efforts with others (Sangbaek electron pID)
- Integrate work with efforts of other group members
- Use pion generator and develop simulations
- Work to reduce noise evident in plots of missing mass and pion mass

Backup Slides

Backup Slides – FTOF path/time

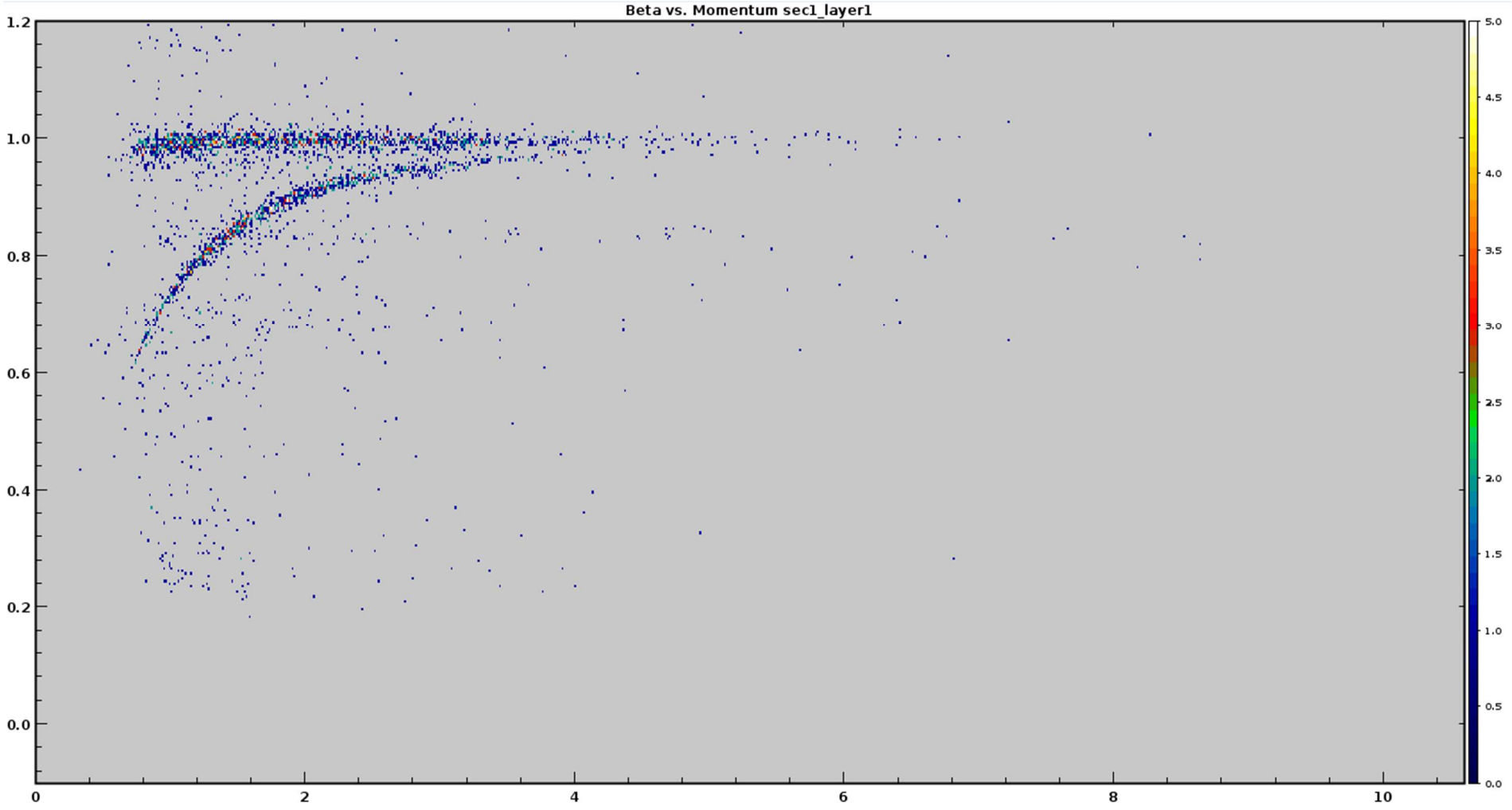


Backup Slides – Progress on Filtering

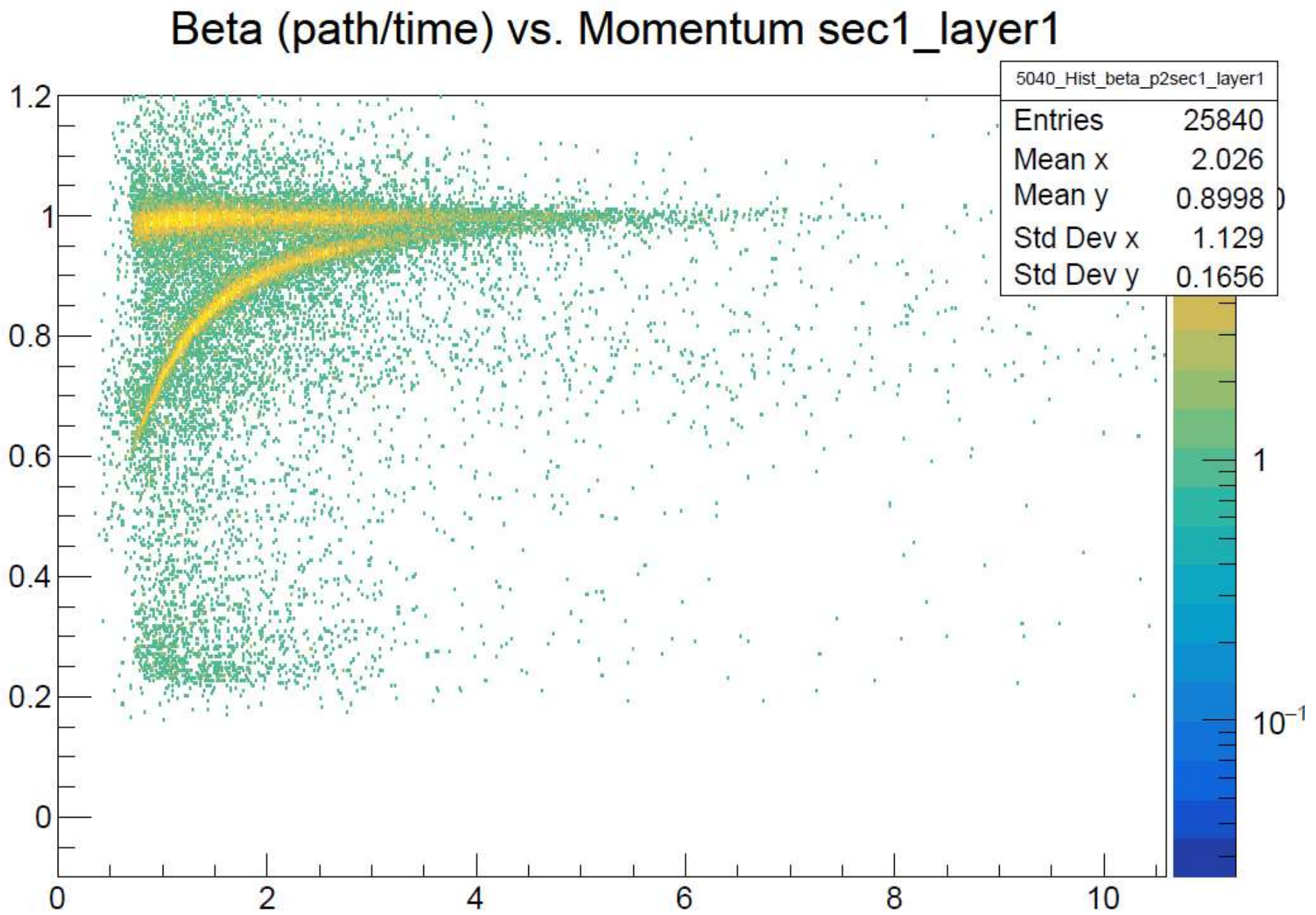


Backup Slides – Using pID=11 Cut

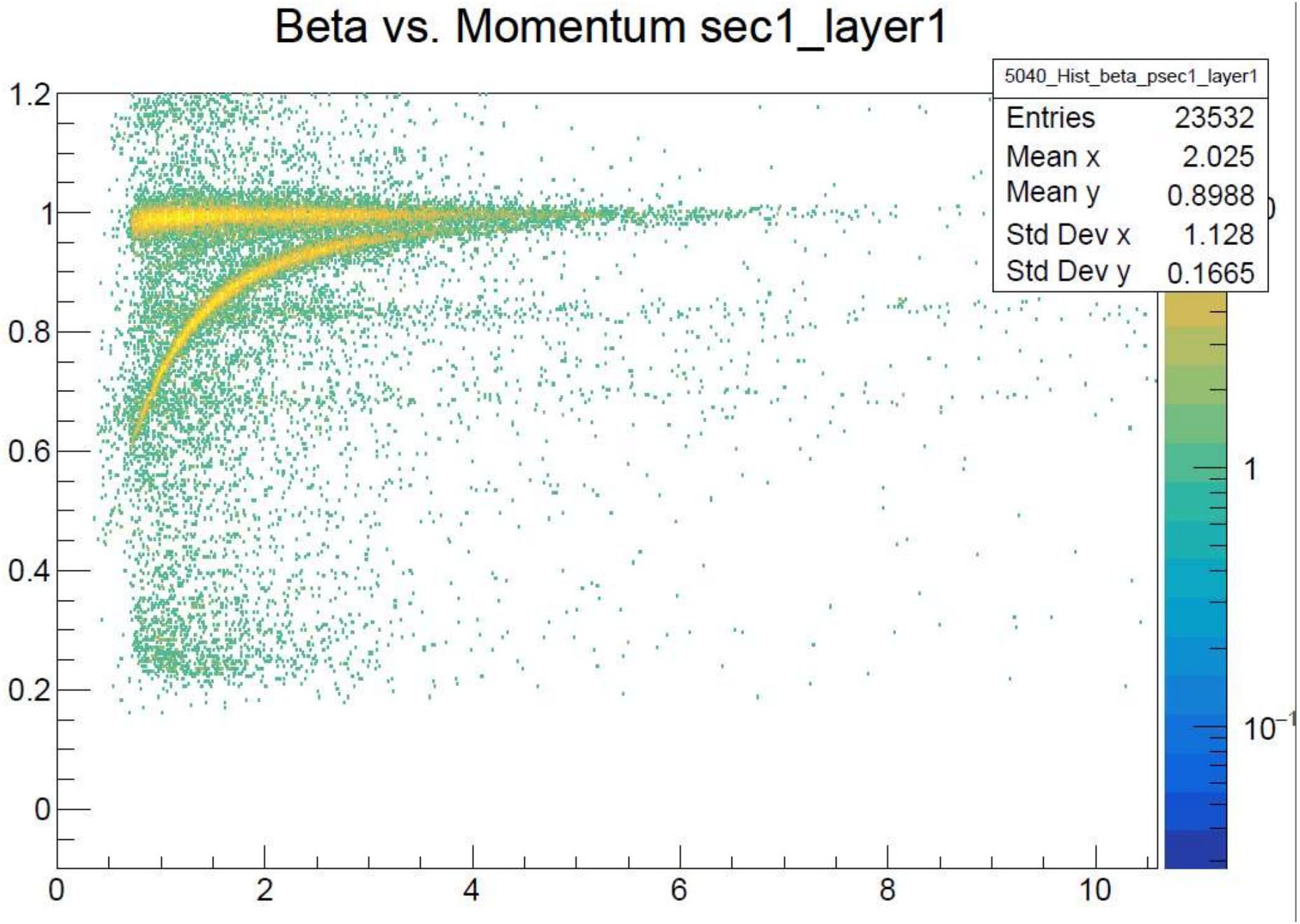
- Lower statistics, not necessarily a problem



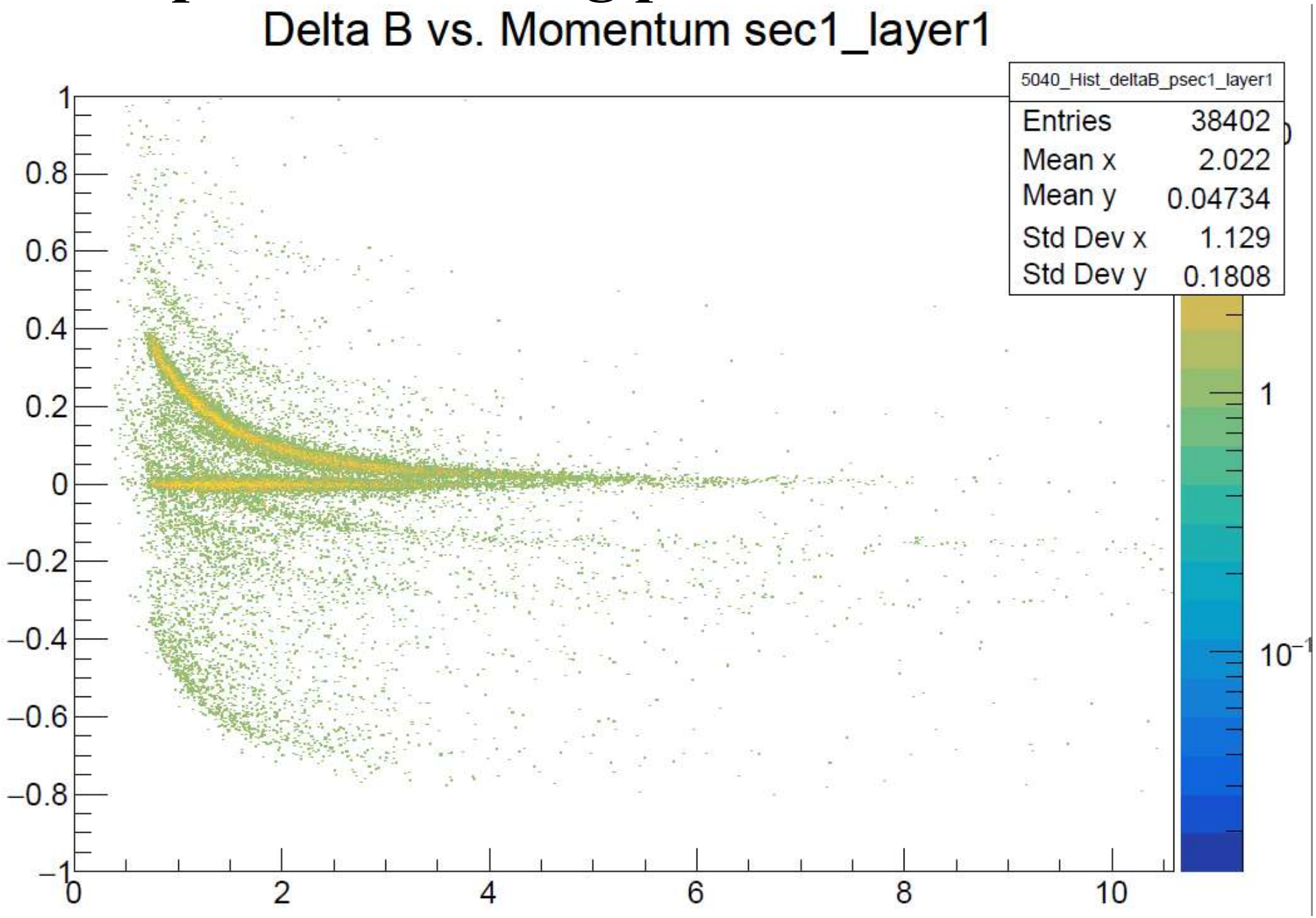
Backup Slides – Using pID=11 Cut



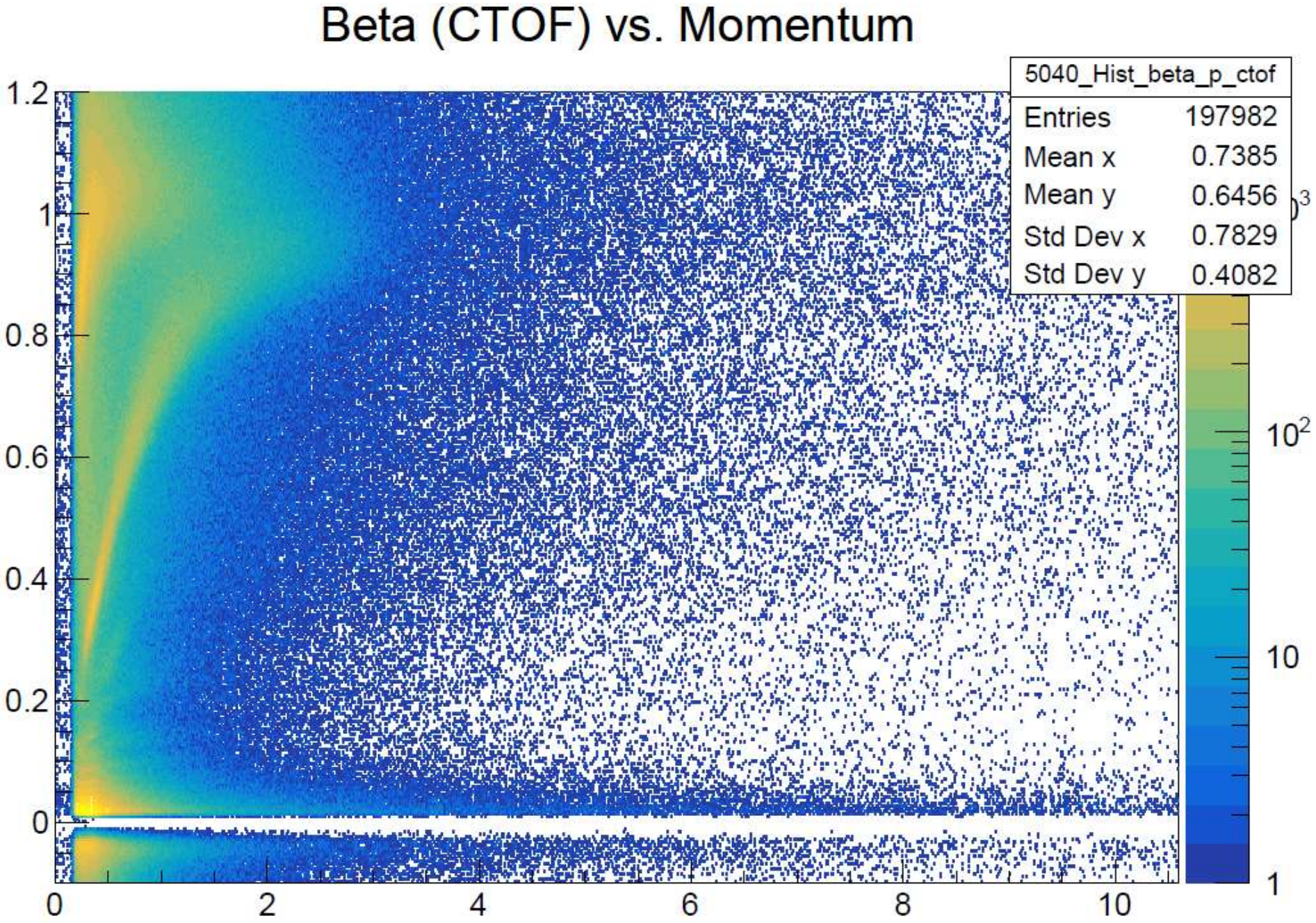
Backup Slides – Using pID=11 Cut



Backup Slides – Using pID=11 Cut



Backup Slides – Using pID=11 Cut



Backup Slides – Using pID=11 Cut