

# Update on SciTil Software

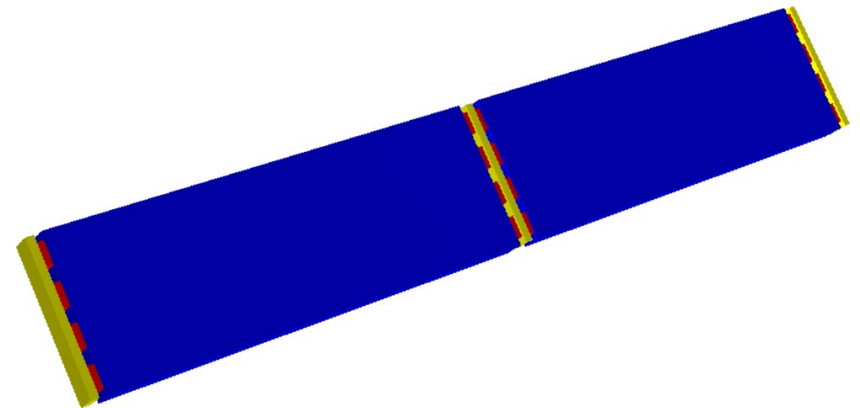
Dominik Steinschaden  
Bochum, 1.3.2016

# Outline

- Geometry Update
- Signal pileup
- PID
- Summary

# Geometry update

- Updated dimension of detector parts to current state of project and technology
  - SiPMs
  - Electronic connectors
  - PCB cards
  - Wrapping of the Scintillator
- Increased fill factor
  - 86.95 x 29.4 x 5 mm scintillator tiles
  - 1920 tiles in total
  - ~ 86% coverage compared to perfect cylinder
- New file: [SciTil\\_201601.root](#)
  - Old files are still usable
- For more information join the SciTil session



Outline of scintillator tiles(blue), read out by 4 SiPM (red) on each side and the corresponding connector cards (yellow)

# Signal pileup and dead time

- Detector dead time
  - Implemented for time based and **event based** simulation
- Signal pile up for close hits implemented
  - Pile up time : 10 ns
- Using the FairWriteoutBuffer for both simulation types
  - **PndSciTHitProducerIdeal outdated**
  - Instead us **PndSciTDigiTask** in digitization
    - ->SetBuffering(kFALSE); to deactivate Pileup and Dead time during digitization (default value = kTRUE)
    - ->RunTimeBased(); for time based digitization

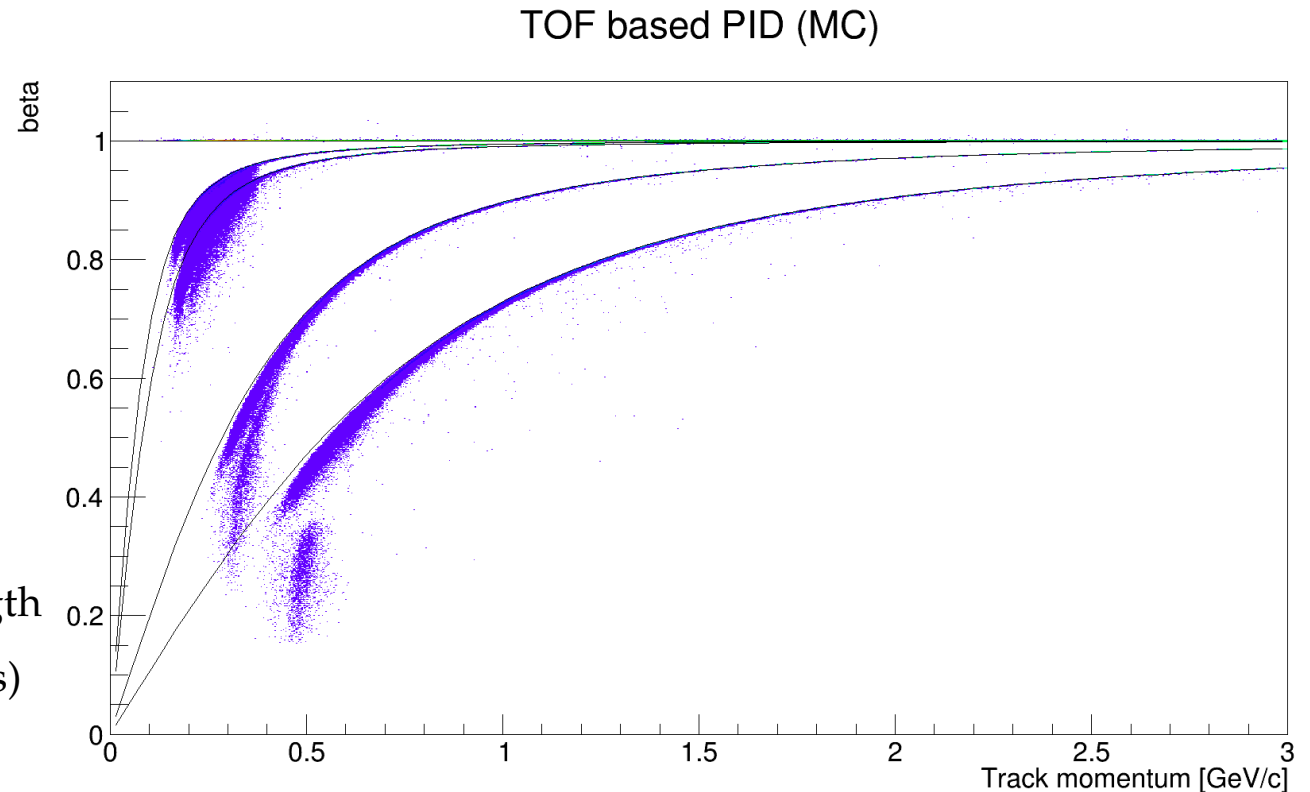
# PID based on SciTil

- Started working on first Version
  - TOF based PID
  - $E_{\text{loss}}$  based PID
- Implementation of TOF based version this month
  - Will be announced in the Forum
- Short summary of the status on the next slides
  - Preliminary results only so far!
  - Feedback and constructive input is always welcome

# TOF based PID

## Evaluation of Beta distribution

- $beta = \frac{track\ length}{time\ of\ flight * c}$
- Boxed generator
  - $P^+, e^-, K^+, \Pi^+, \mu^-$
  - $P = 0.05 - 3\ GeV/c$
  - $\theta = 20 - 140^\circ$
  - $10^6$  events each
- Input parameter
  - MC momentum, MC track length
  - SciTil time (MC,  $\sigma = 100/50\ ps$ )
  - T0 (MC, estimated  $\sigma$ )
- Reference:  $beta = \sqrt{\frac{p^2}{m_0^2 * p^2}}$

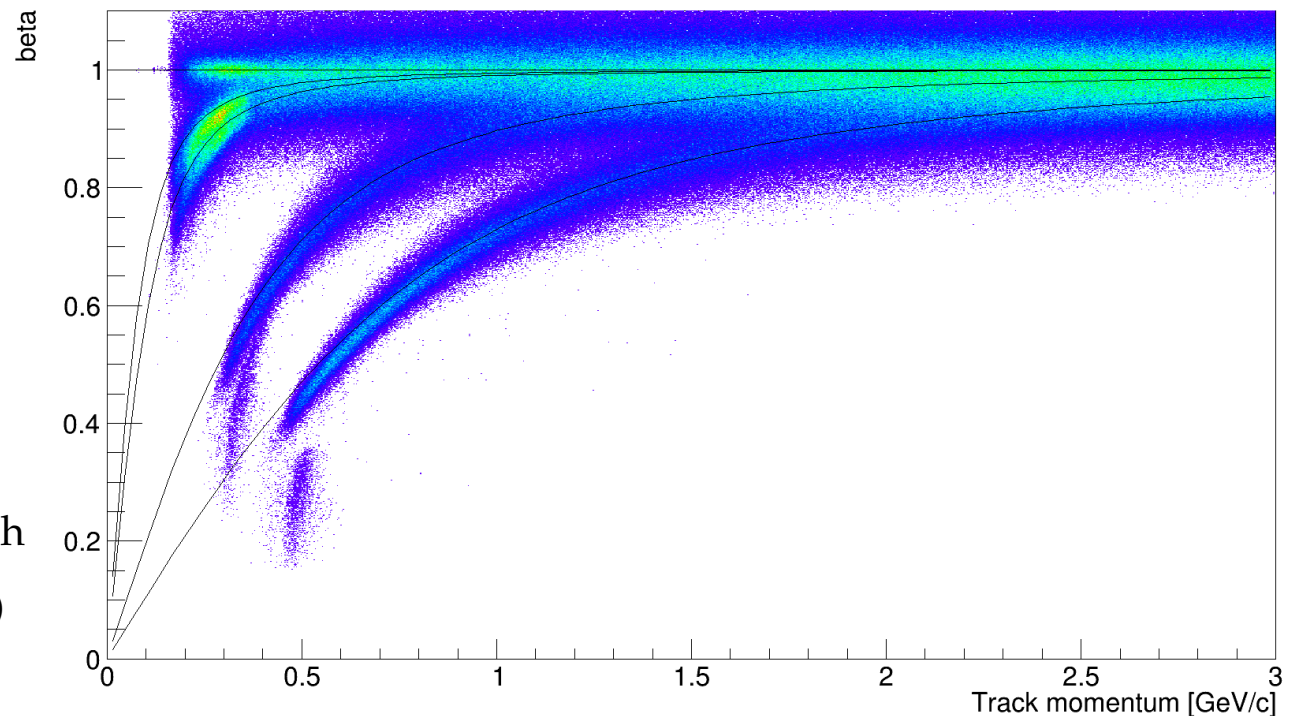


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TOF based PID (sigma = 100ps)

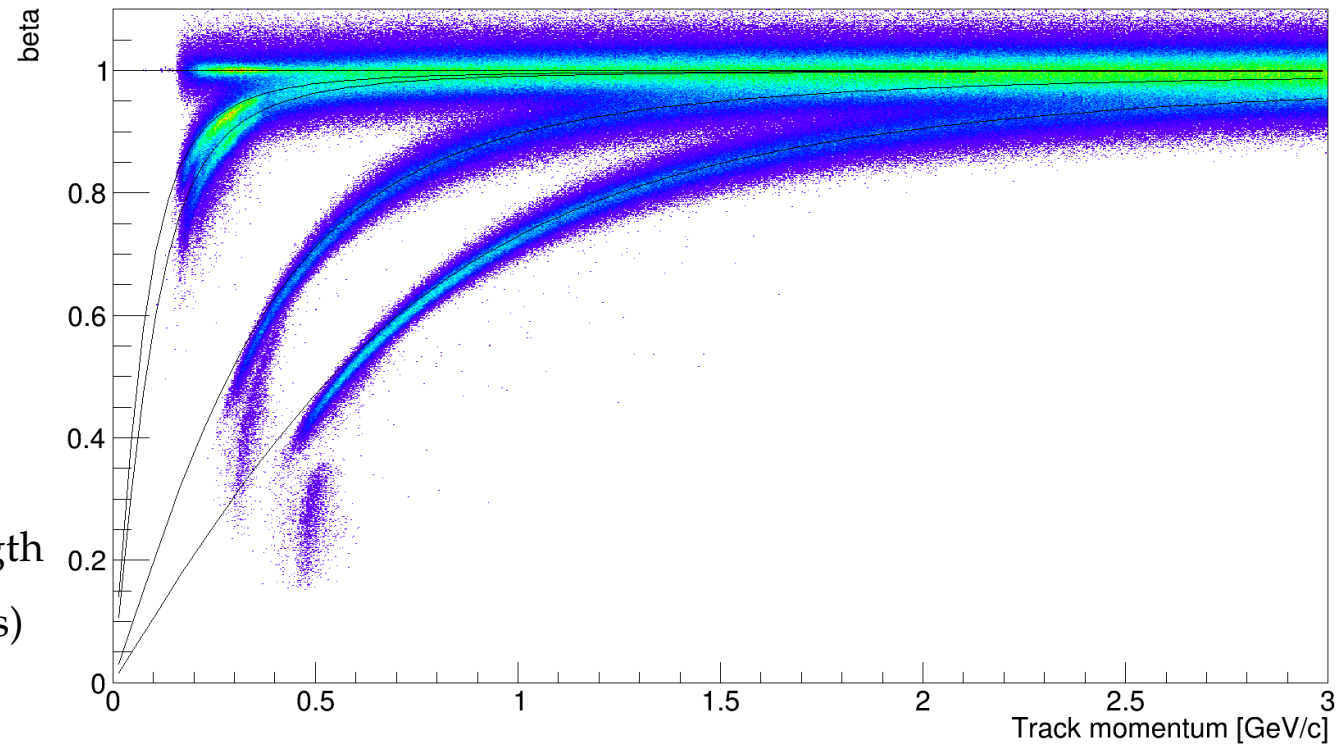


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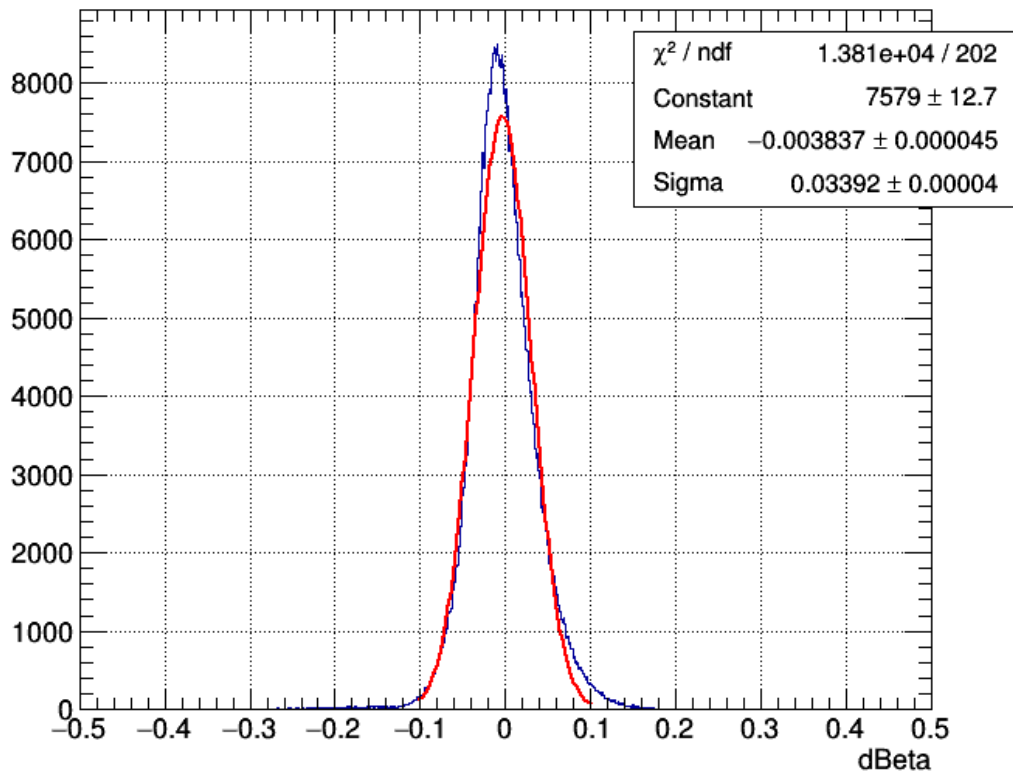
TOF based PID (sigma = 50ps)



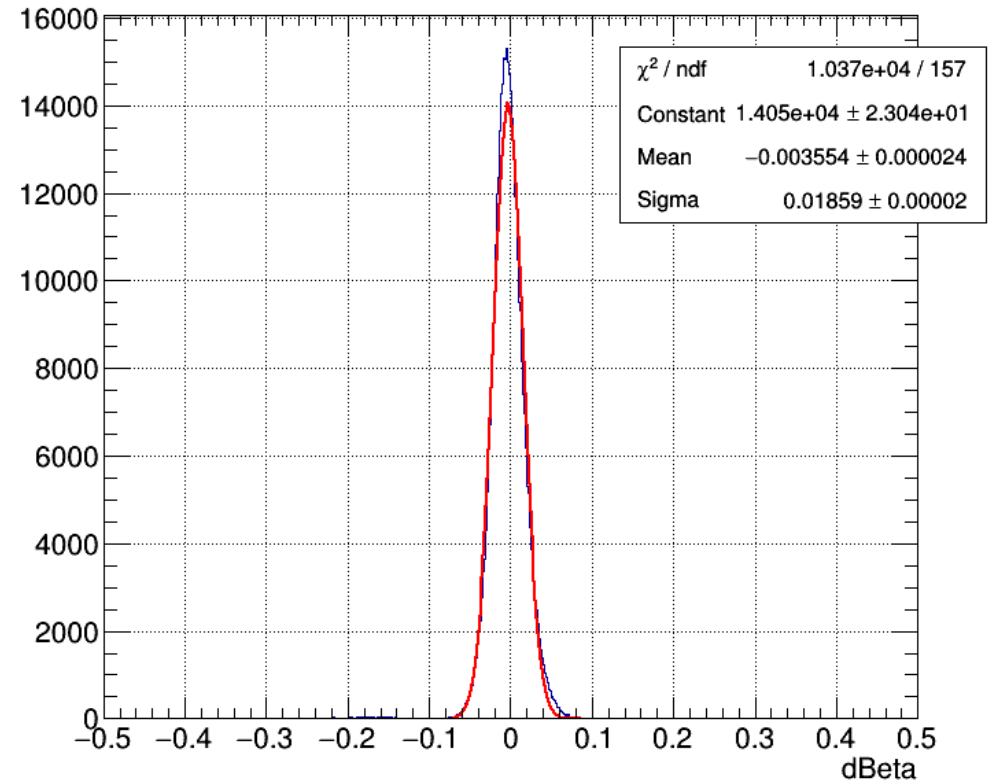


# TOF based PID

TOF based Beta uncertainty for proton (sigma = 100ps)

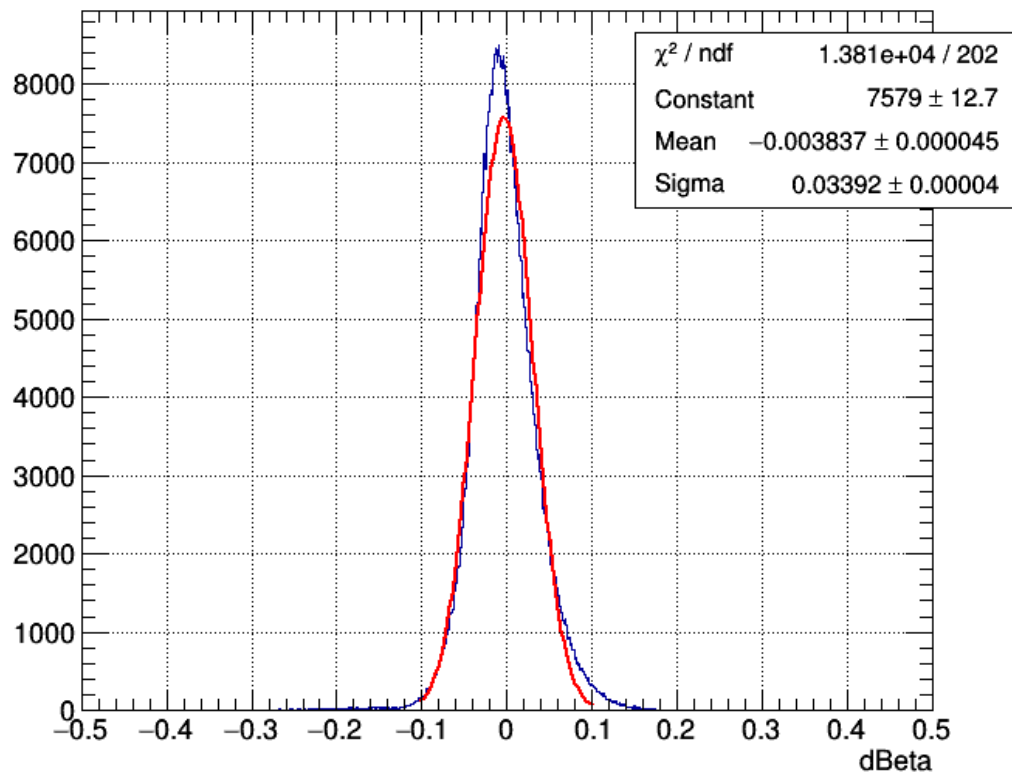


TOF based Beta uncertainty for proton (sigma = 50ps)

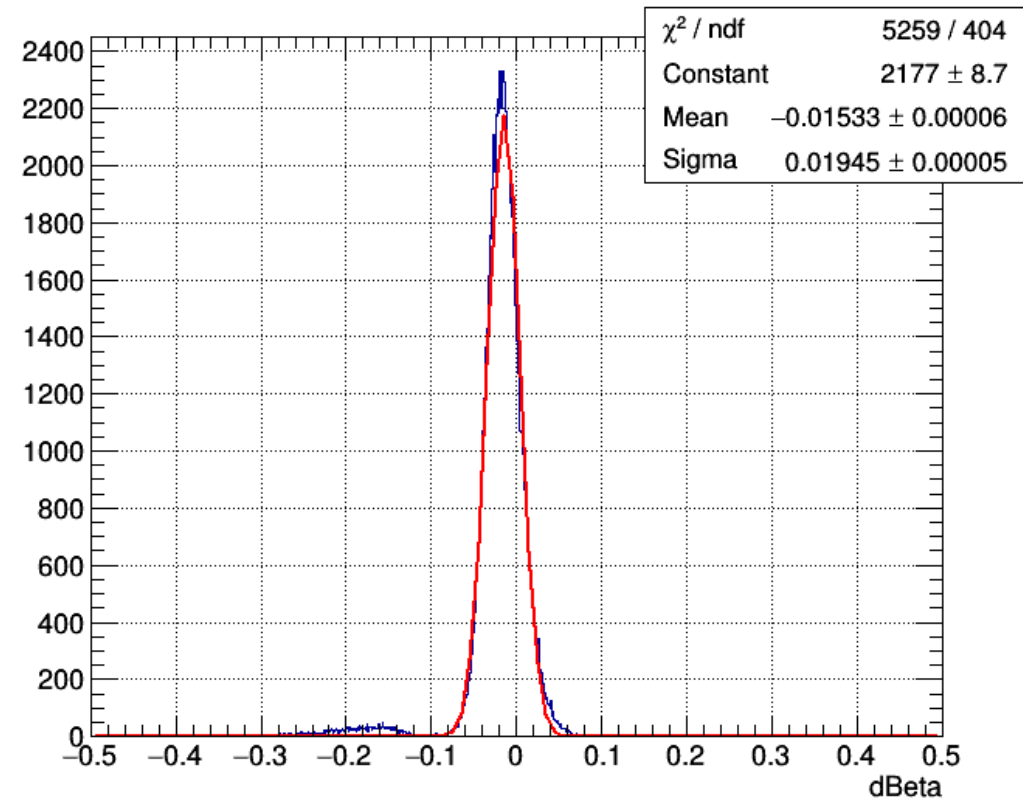


# TOF based PID

TOF based Beta uncertainty for proton (sigma = 100ps)

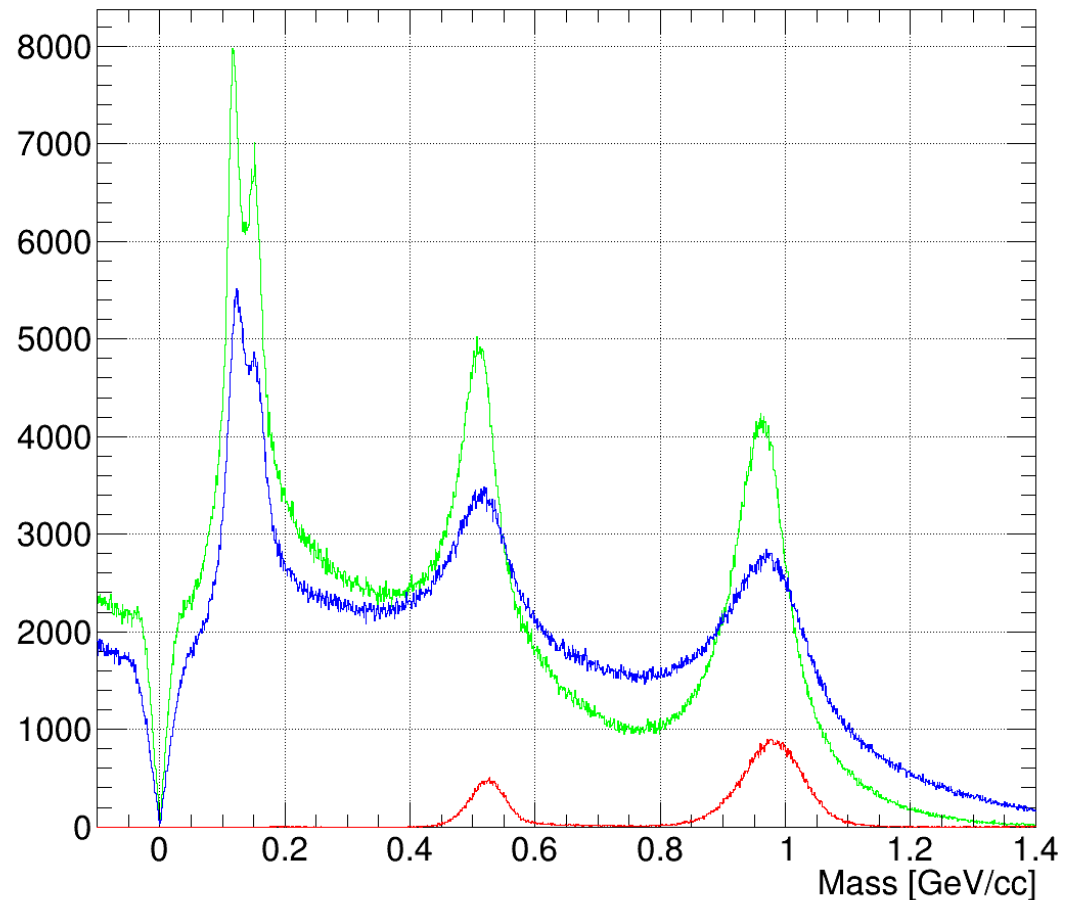


TOF based Beta uncertainty for proton (sigma = 100ps, Beta < 0.684932)



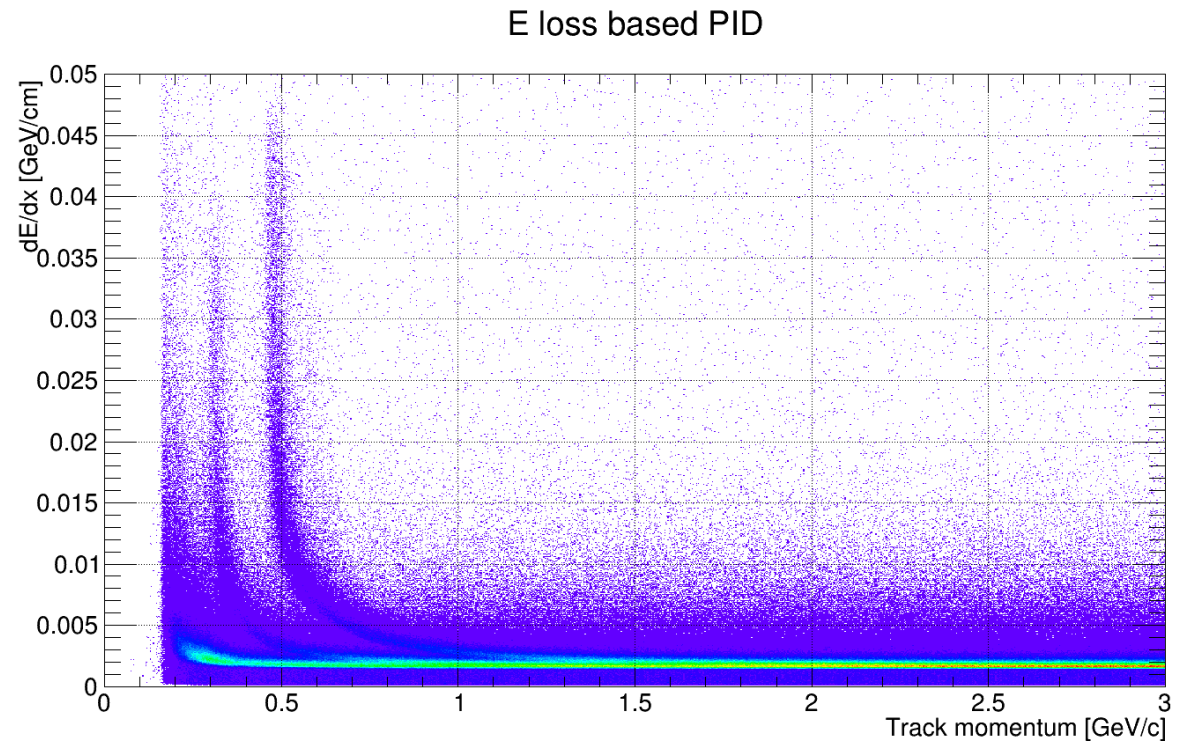
# TOF based PID

- Mass distribution
  - $\Delta t = 100$  ps
  - $\Delta t = 50$  ps
  - $\Delta t = 100$  ps ,  
beta < 0.684
- Slow Particles below Cherenkov threshold of DIRC well separated



# Summary and Outlook

- Evaluation of Beta and Mass distribution still under progress
- Implementation in Pandaroot will start in the next weeks
- Providing additional information and PID based on  $dE/dx$



Thank you for the attention

# TOF based PID

