

Update on SciTil Software

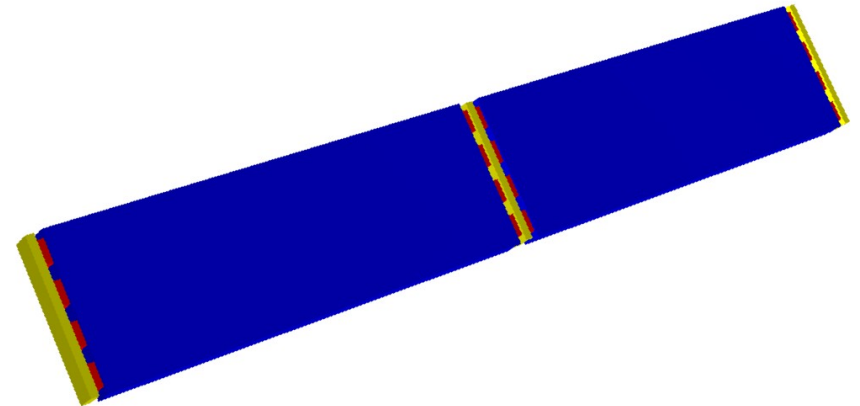
Dominik Steinschaden
Bochum, 1.3.2016

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 - **PndSciTHitProducerIdeal outdated**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

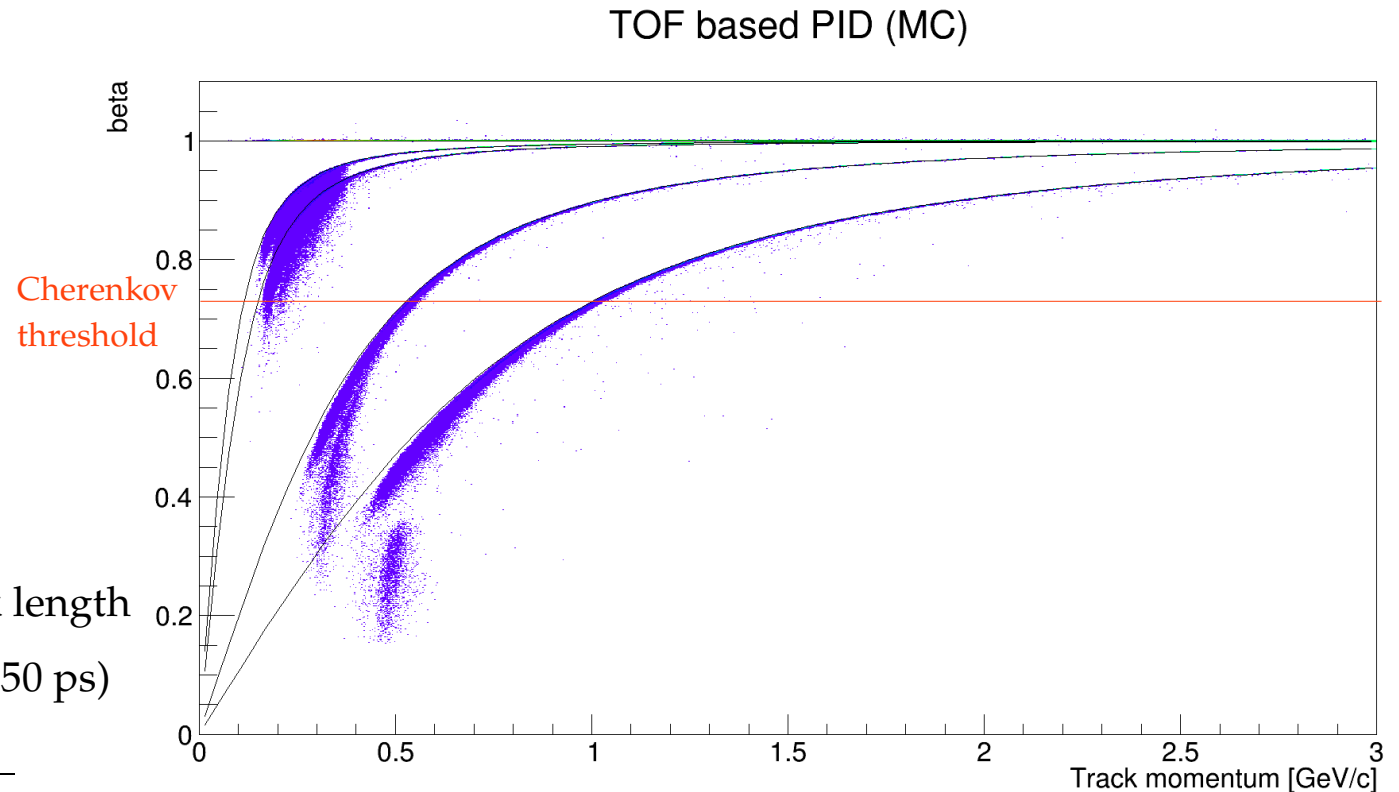
PID based on SciTil

- Started working on first Version
 - TOF based PID
 - E_{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 σ)
- Reference: $beta = \sqrt{\frac{p^2}{m_0^2 * p^2}}$

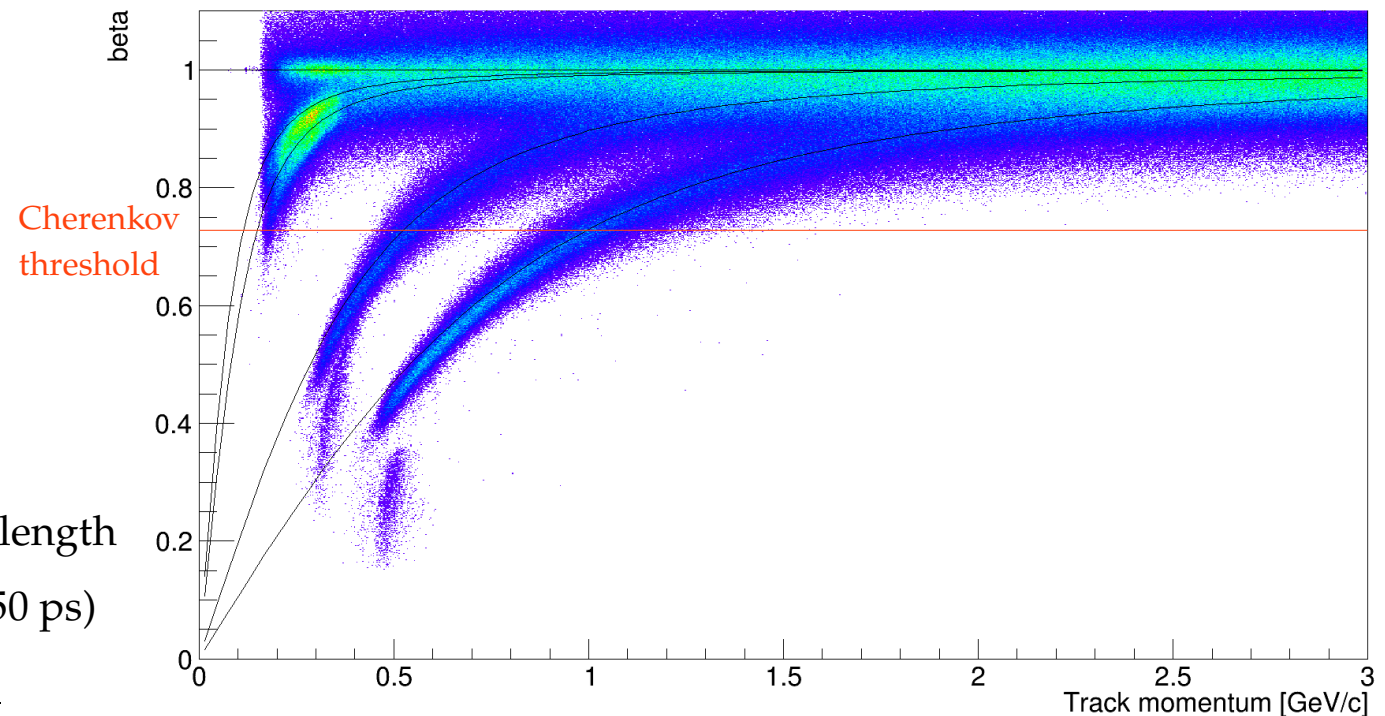


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TOF based PID (sigma = 100ps)

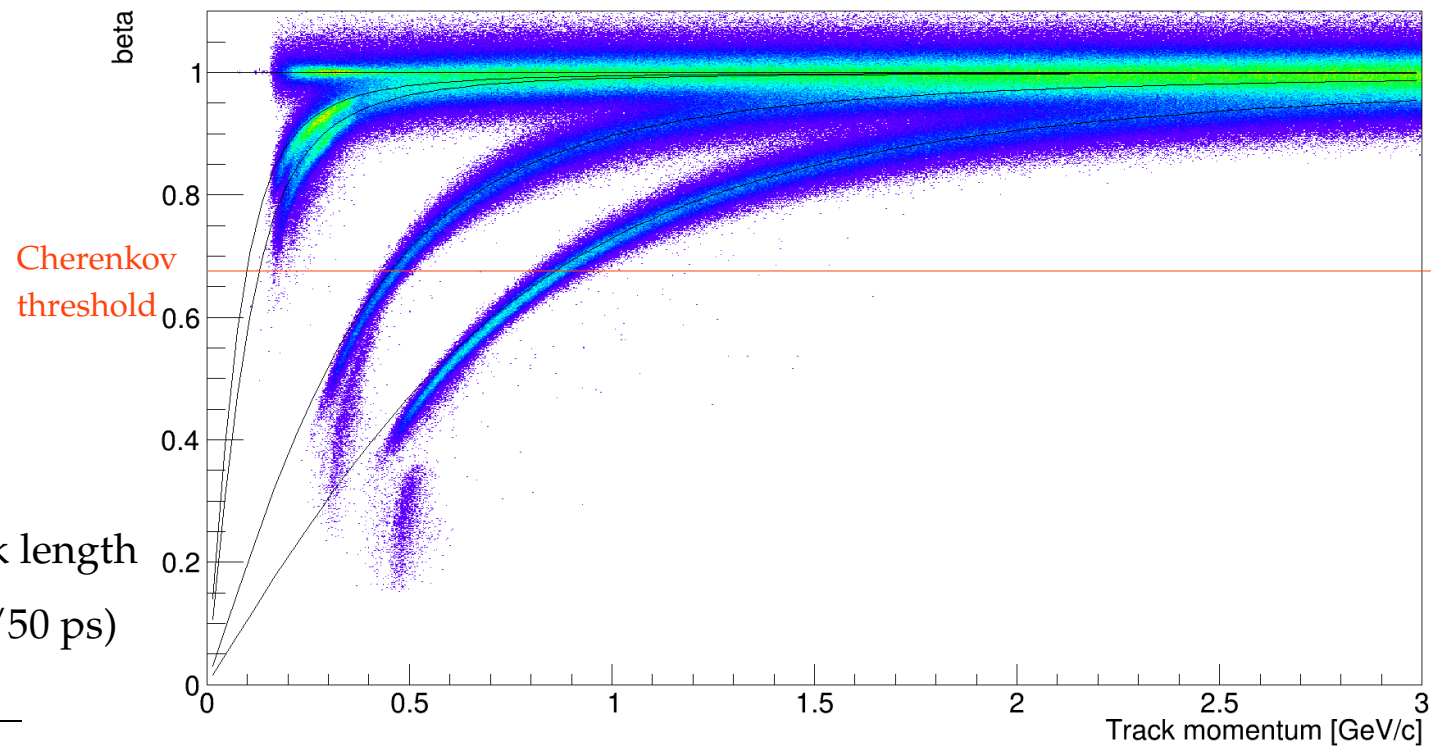


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TOF based PID (sigma = 50ps)

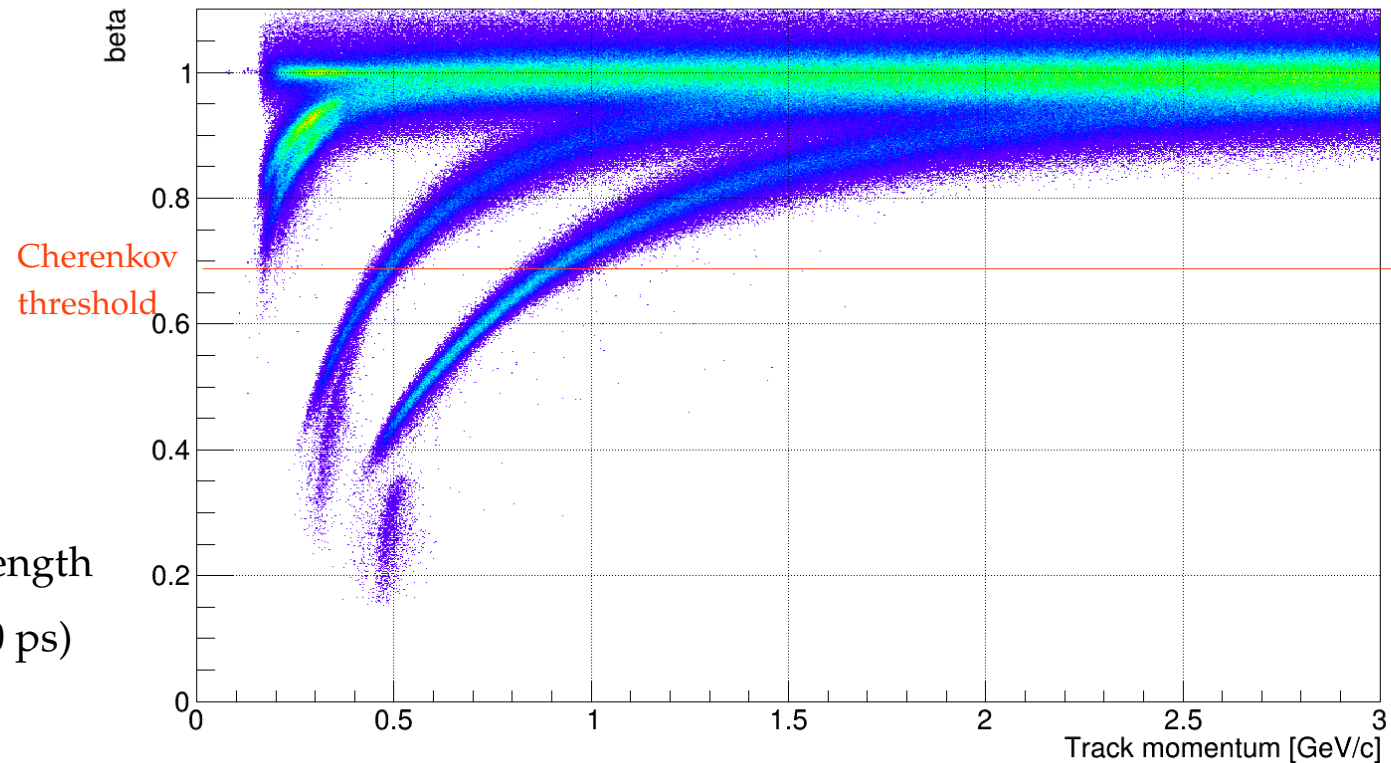


TOF based PID

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TOF based PID (realistic T0, sigma = 50ps)

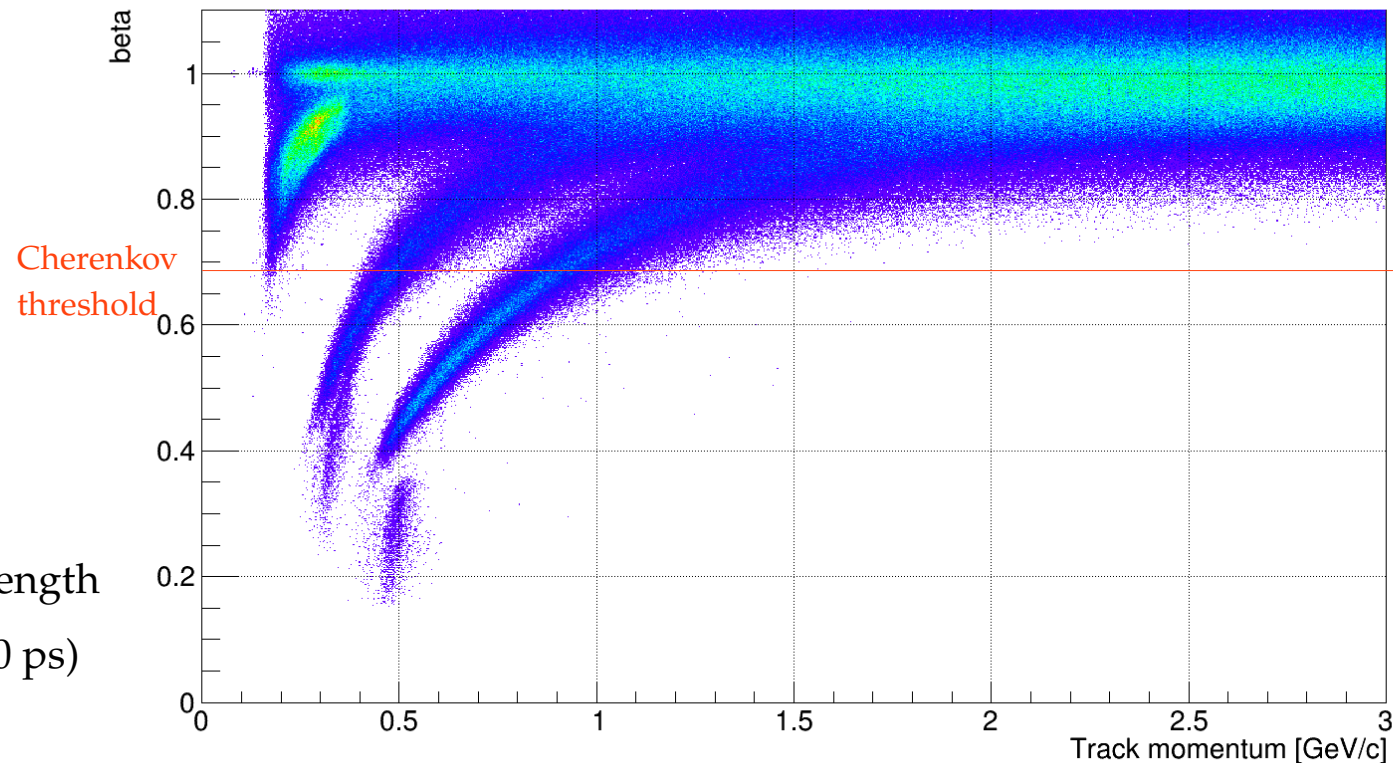


TOF based PID

Evaluation of Beta distribution

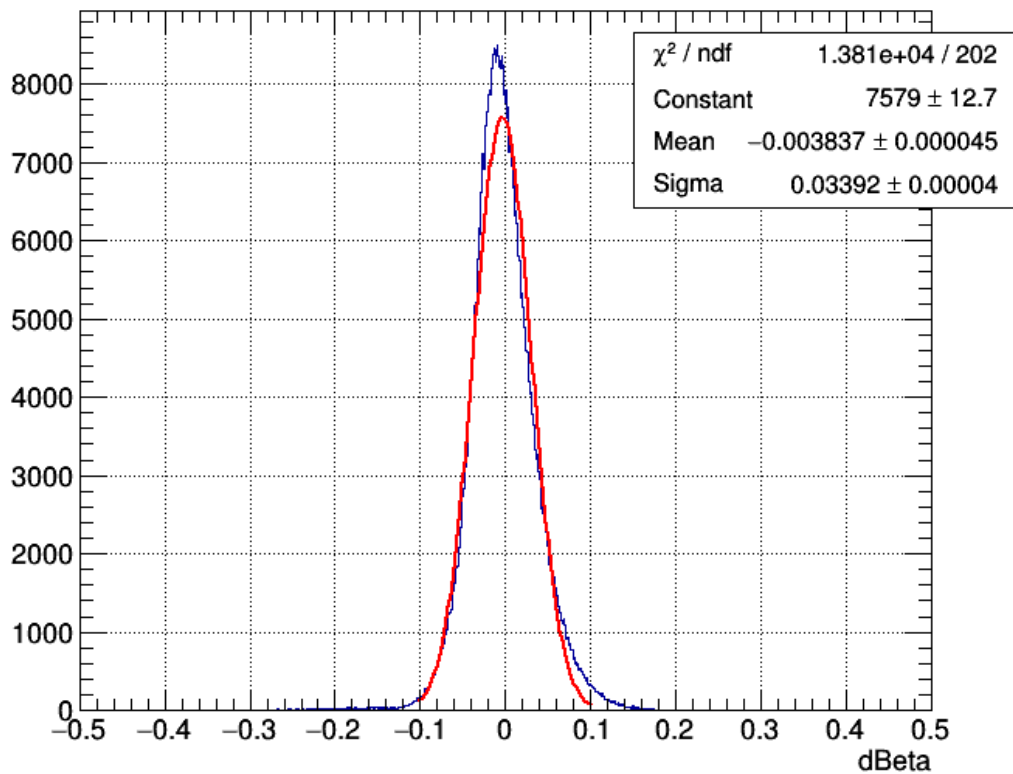
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TOF based PID (realistic T0, sigma = 100ps)

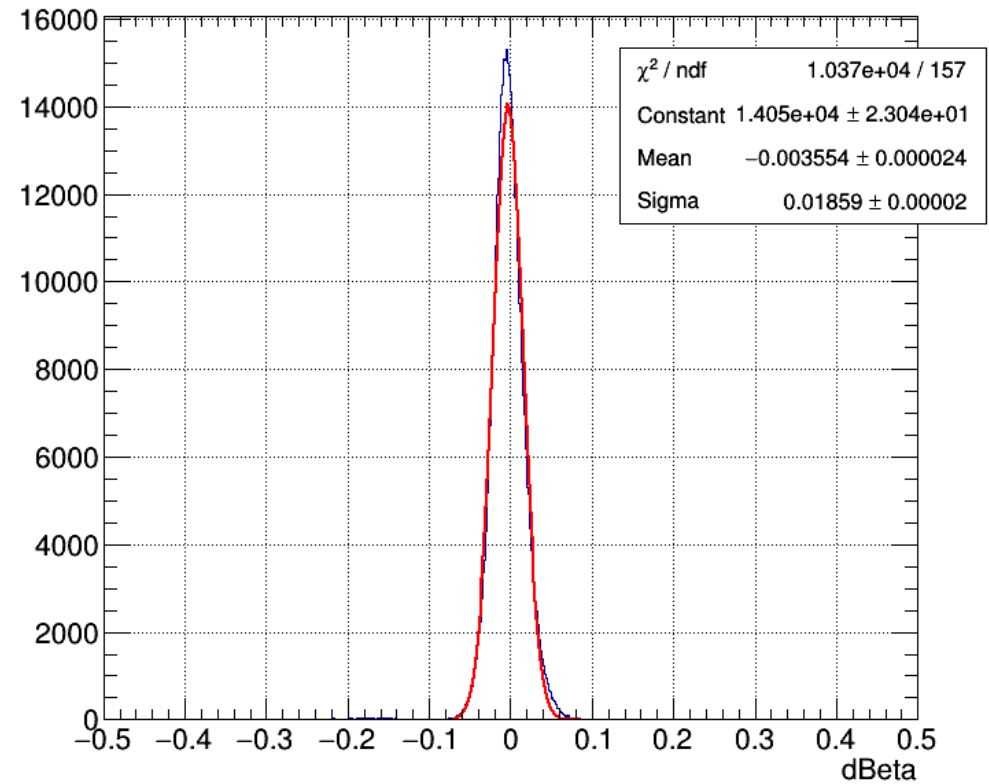


TOF based PID

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

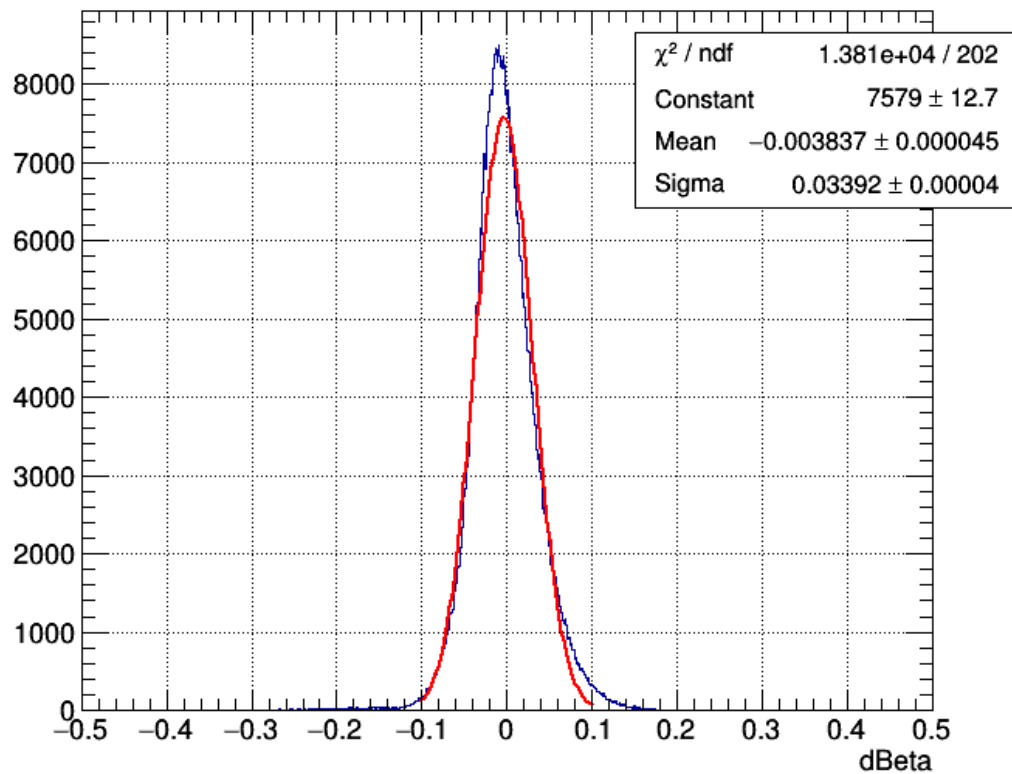


TOF based Beta uncertainty for proton (sigma = 50ps)

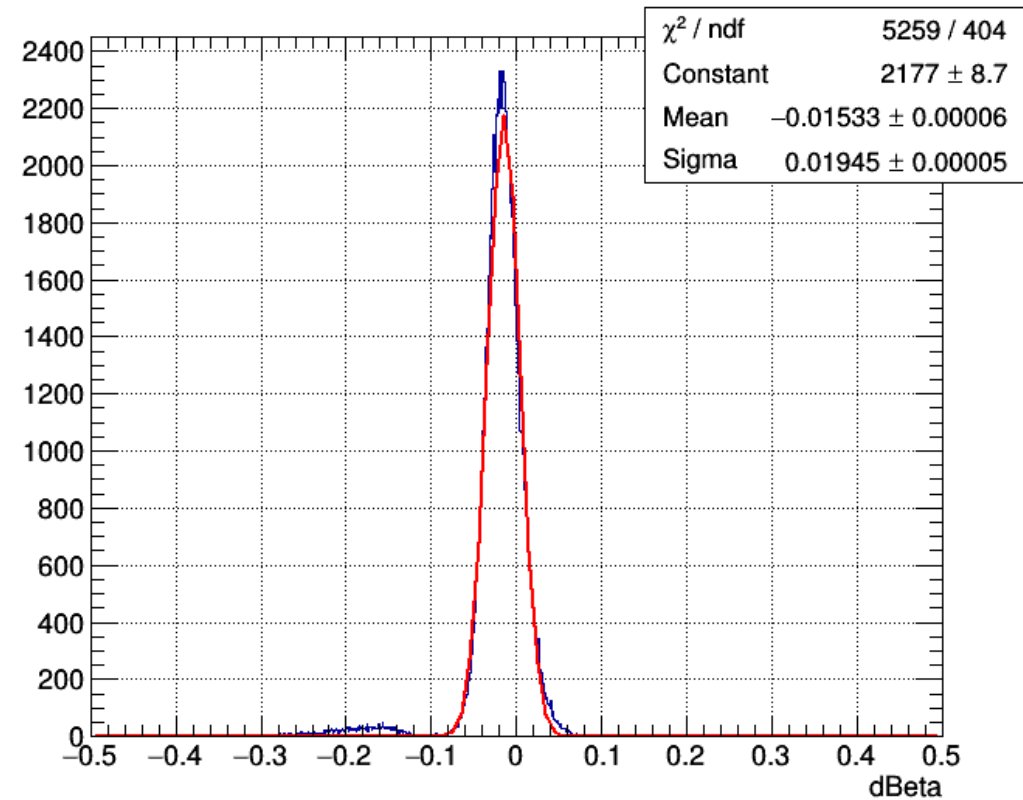


TOF based PID

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

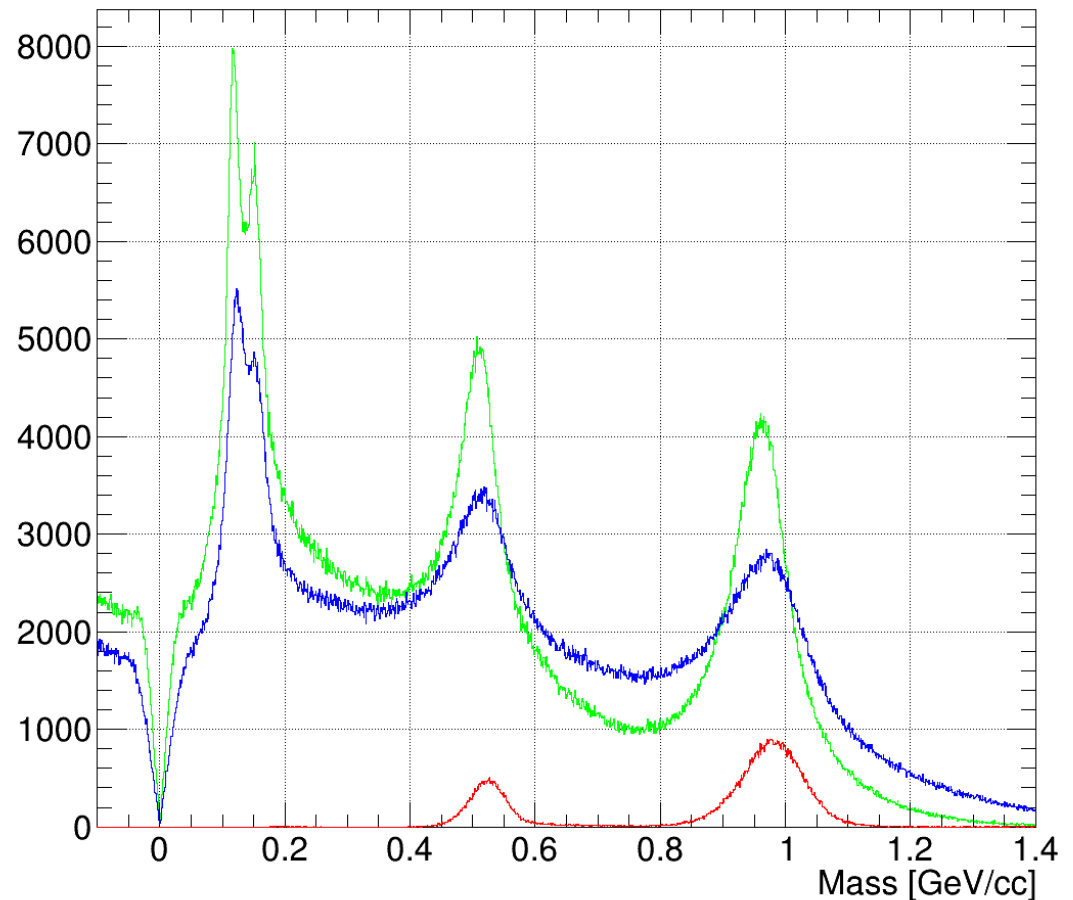


TOF based Beta uncertainty for proton (sigma = 100ps, Beta < 0.684932)



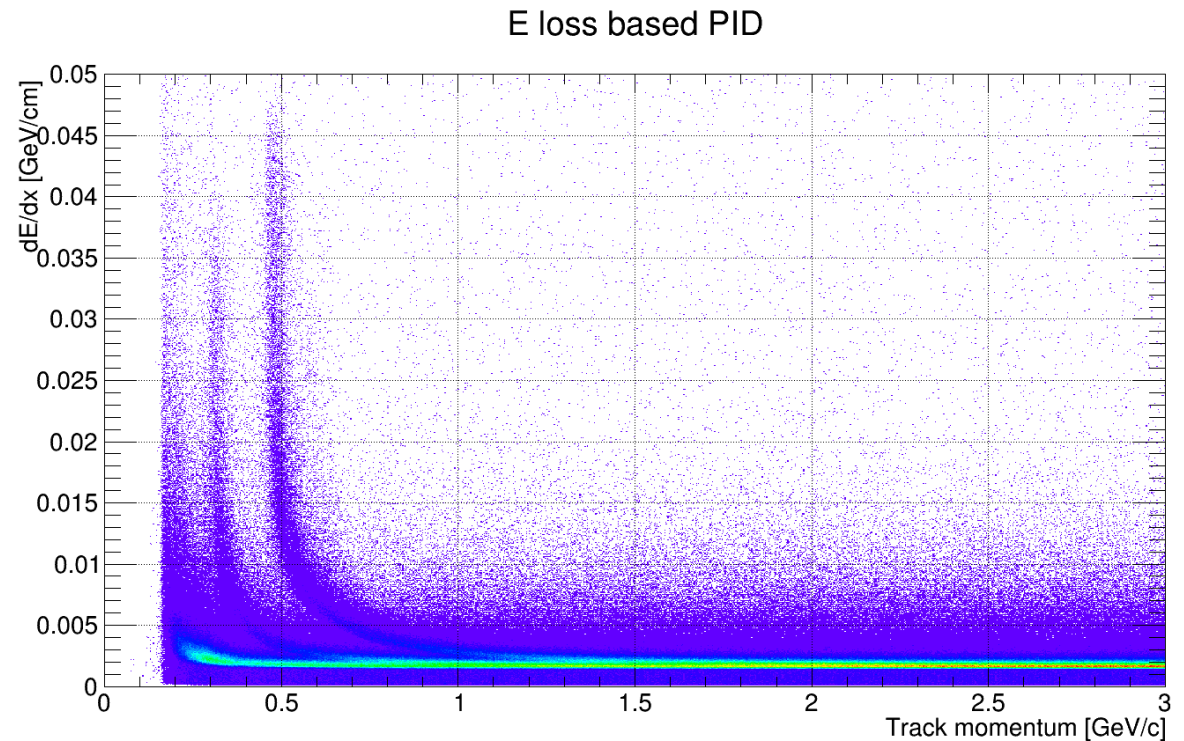
TOF based PID

- 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

