

Measurement of dE/dx in DCH

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Introduction

- ▶ First version of the dE/dx measurement presented at Warwick
 - ▶ all main elements were implemented
 - ▶ dE/dx information of cell stored at the PacSimHit level
- ▶ Code has been re-designed to make the dE/dx measurement implemented at the reconstruction level
 - ▶ details in next slides

dE/dx measurement of the single cell

- ▶ `PacTrkHitViewDch::getHitInfo(...)`:
 - ▶ Compute the mean $\langle dE/dx \rangle$ and the traversed dx
 - ▶ Compute the measured dE_{hit} with Gaussian fluctuation
 - ▶ $\text{Gauss}(\mu, \sigma)$: $\mu = \langle dE/dx \rangle * dx$ $\sigma = \alpha * \mu^n * dx^{-1/2}$

α is a parameter provided by the user via xml. It is actually ‘normalized’ so that it corresponds to $\sigma(\langle dE/dx \rangle) / \langle dE/dx \rangle = \alpha$ for a MIP crossing 40 layers of DCH (“BaBar” like) at $\theta=90^\circ$

This way it has a precise physical meaning. Other ‘normalizations’ are possible.

n is currently set to 1. It may be convenient to make it a parameter provided by the user as α

- ▶ return $\langle dE/dx \rangle_{\text{hit}}$ and its error, together with the position of the DCH hit

dE/dx measurement of the single cell

- ▶ **PacTrk/PacHitOnTrk.hh**
 - ▶ added data members `_dedx` and `_ededx`
 - ▶ and methods `getdEdx()`, `getErrdEdx()`, `setdEdx(...)`, `setErrdEdx(...)`
- ▶ **PacTrkHitMeas::createHots()**
 - ▶ when the hit is created in `createHots()`, the `PacHitOnTrk` is given the measurement of dE/dx

Now the reco hits of DCH have an associated dE/dx measurement

dE/dx of the track

- ▶ PacTrk/PacTruncMean.hh/cc

- ▶ usage:

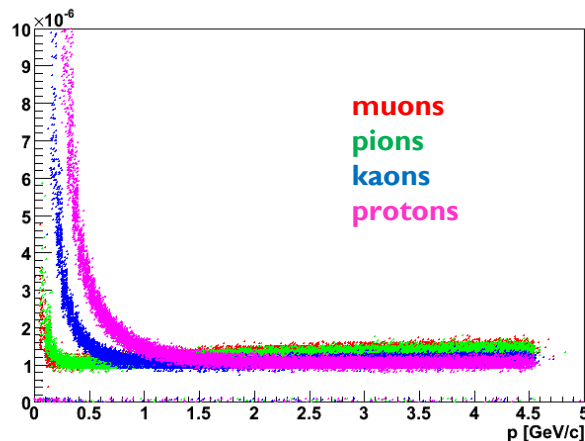
in PacMicroAdapter::buildQual()

```
double dedxdch;  
double ededxdch;  
PacTruncMean truncMean(recotrk);  
truncMean.getdEdxDch(dedxdch,ededxdch);  
_pidQual->setDEdXDch(dedxdch);
```

- ▶ PacTruncMean loops over the DCH hits of the TrkRecoTrk and computes the truncated mean. The truncated mean fraction is a data member of PacTrkHitViewDch provided by the user via xml
 - ▶ Note: in this current effective parameterization (no Landau-like dE distributions) it's probably reasonable setting `_truncFrac=100%` and setting the parameter α to set the desired resolution

Summary and plans

- ▶ New version of the DCH dE/dx measurement implemented in FastSim
- ▶ Code ready for commit to SVN
- ▶ Next steps:
 - ▶ commit the code
 - ▶ do performance studies to tune the dE/dx output
 - ▶ use BaBar detector configuration for tuning
 - ▶ work with PID group to develop PID selectors including dE/dx



Zoom

