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 <dE/dx> and the traversed dx
  - Compute the measured dE_hit with Gaussian fluctuation
    - Gauss(μ,σ): μ = <dE/dx>*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 $\sigma(<dE/dx>)/<dE/dx> = \alpha$ for a MIP crossing 40 layers of DCH ("BaBar" like) at $\theta=90^o$
This way it has a precise physical meaning. Other 'normalizations' are possible.

n is currently set to1. It may be convenient to make it a parameter provided by the user as α

- return <dE/dx>_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