Possibility of dE/dx identification with svx

SVX software meeting

Ermias Atomssa
SBU

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The possibility to do hitwise identification using dE/dx in stripixel layers is investigated. The following settings were used

- Input (Exodus)
  - 100k traks each of e^+, e^-, π^+, π^-, K^+ and K^-
  - Flat p_T from 0 to 10 GeV/c, full azimuth, -0.5$< y <$0.5
  - Traks were arranged into 100 events containing 10 of each of the six particles, with event z vertex flat between -20 cm and 20 cm
- PISA
  - Settings suggested in Wiki page were used (PIPN, HBGN, phnx.par from cvs and new build)
- Reconstruction
  - Fun4KalSim.C macro used with other subsystems turned off except Svx, VtxReco DC and PC.
  - Almost the same as SvxStandalone reco
- All files in directory /direct/phenix+hl/tujuba/svx/dedx

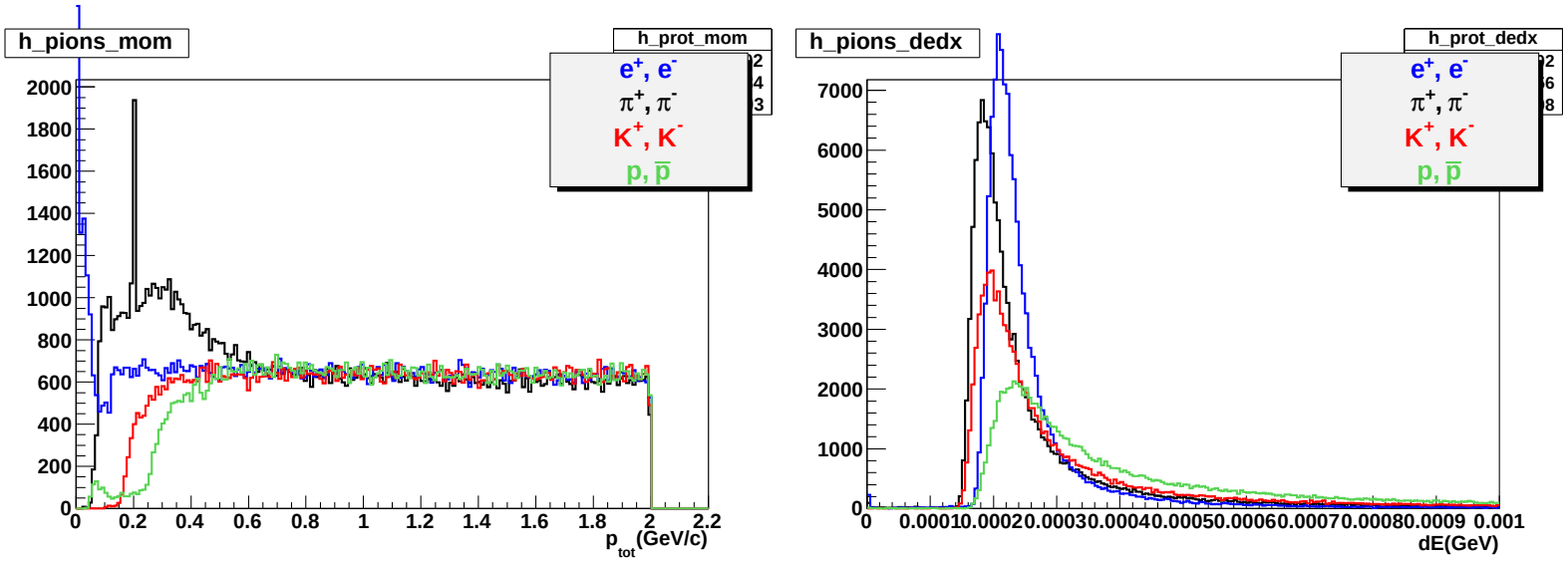
Procedure

Ntuples were produced from simDST output

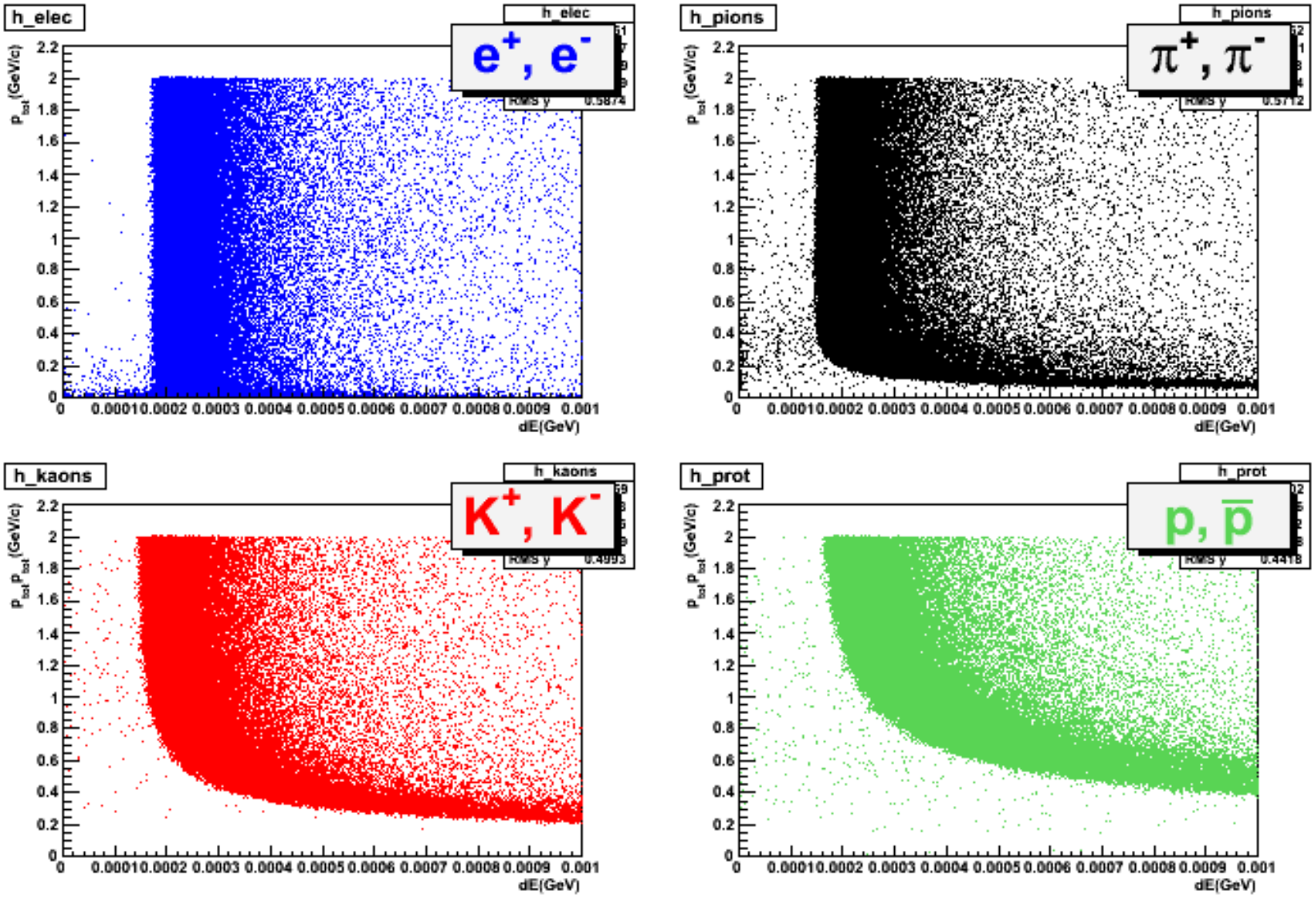
- Each Ntuple entry is a **GEANT track** (pid, px, py, pz, E), with the simulated (from GhitList) and reconstructed (from ClusterList) dE/dx at the different layers (maximum of eight allowd*) was recorded in the Ntuple
- No reconstructed dE/dx for layers 0 and 1
- In the following slides the dE/dx at layer 2 (first stripixel layer) of accepcted trakcs is plotted against "true" p_{Tot}
- The argument here is that if the geant dE/dx can not be used to id hits, then the reconstructed cluster dE/dx certainly can't

* Some Ghits were discovered to be reconstructed into multiple clusters - probably a bug in clustering? - might be the cause of some ghost tracks.

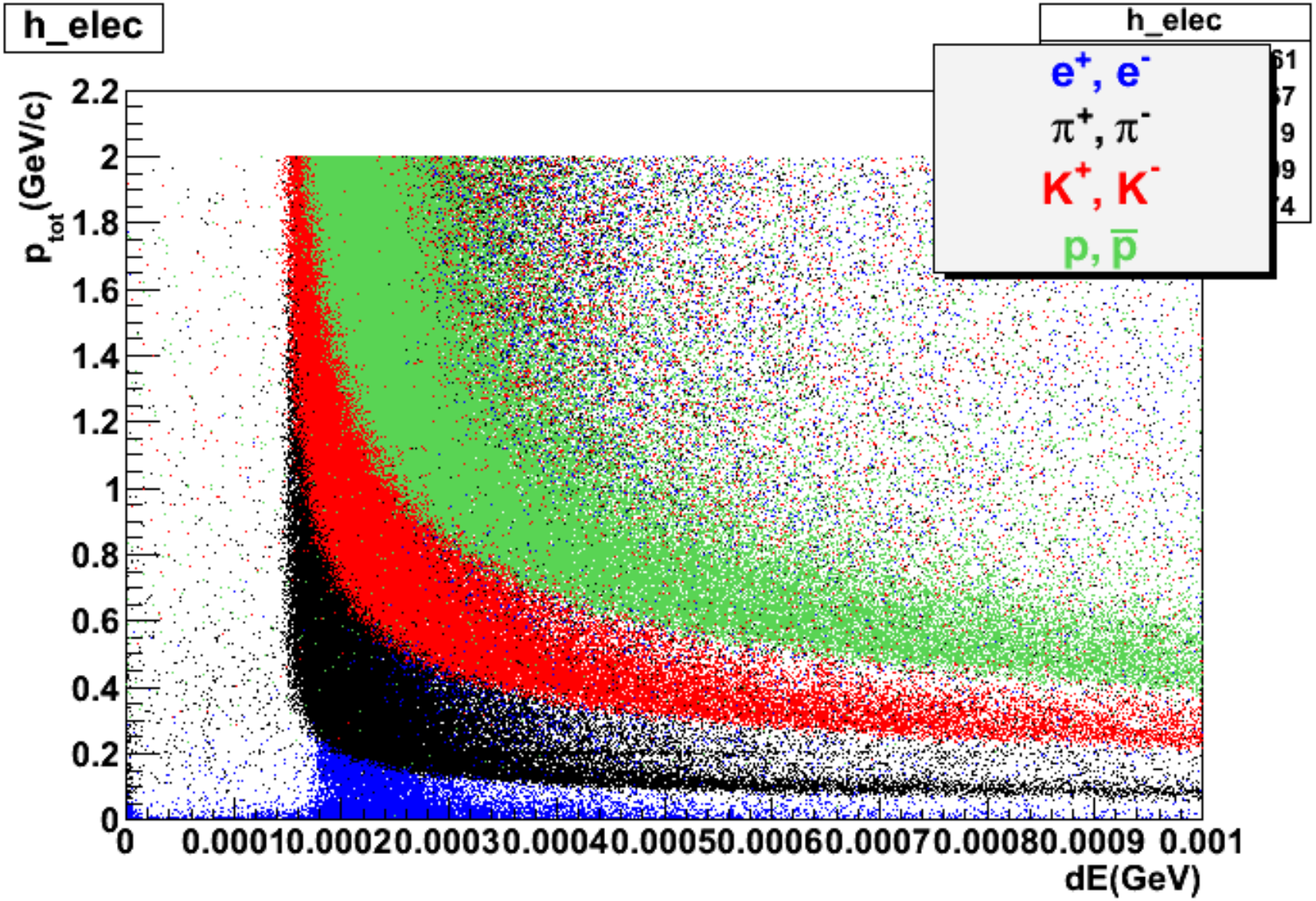
Total momentum and dE/dx distributions



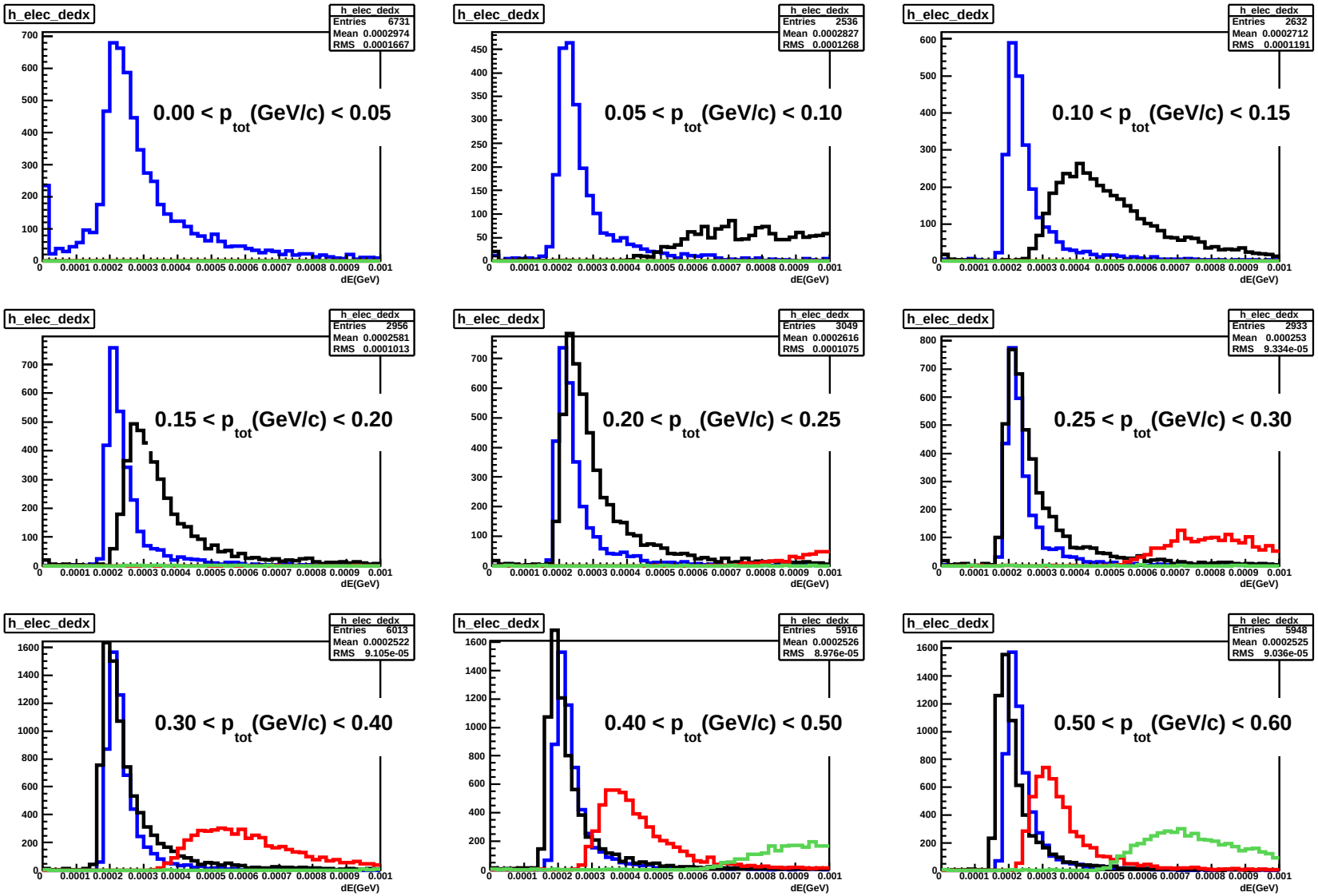
Simulated dE/dx from $e^{\pm}$, $\pi^{\pm}$, $K^{\pm}$ (1/2)



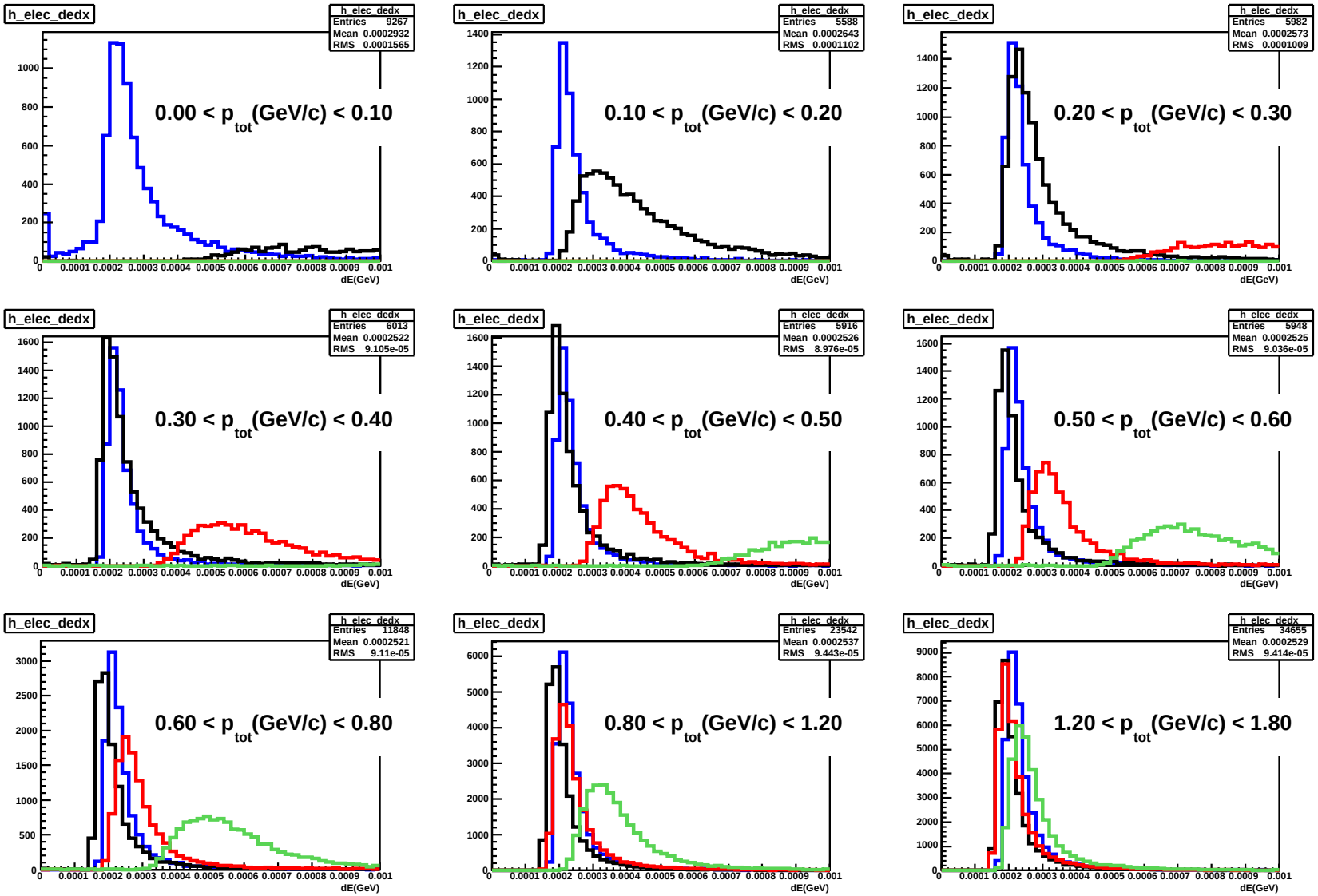
Simulated dE/dx from $e^{\pm}$, $\pi^{\pm}$, $K^{\pm}$ (1/2)



dE/dx distributions in momentum windows (p_{tot} <0.6 GeV/c)



dE/dx distributions in momentum windows (p_{tot} <1.8 GeV/c)



Conclusion

The dE/dx information available in the first stripixel layer can be used to identify tracks within certain kinematical ranges

- Pions from electrons at $p_{tot} < 200$ MeV/c
- Kaons from pions and electrons at $p_{tot} < 600$ MeV/c
- (Anti)protons from kaons, pions and electrons at $p_{tot} < 1.2$ GeV/c

Higher than 1.2 GeV/c, the dE/dx distributions from (anti)protons, pions, kaons and electrons peak almost at the same value and do not change significantly.