

Particle identification using dE/dx : trackers with different number of layers

Ruslan Akhunzyanov
JINR

SPD Physics & MC Meeting

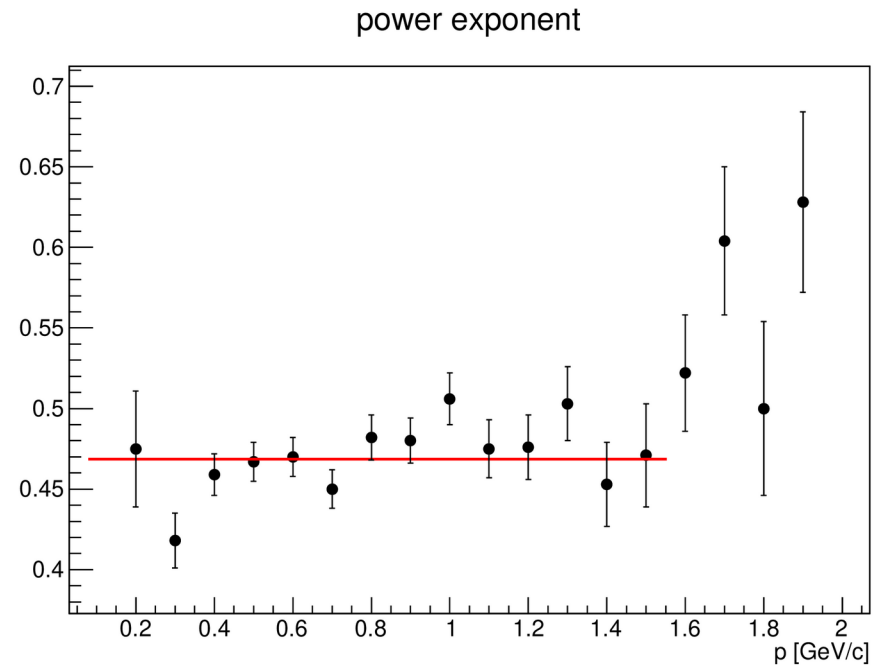
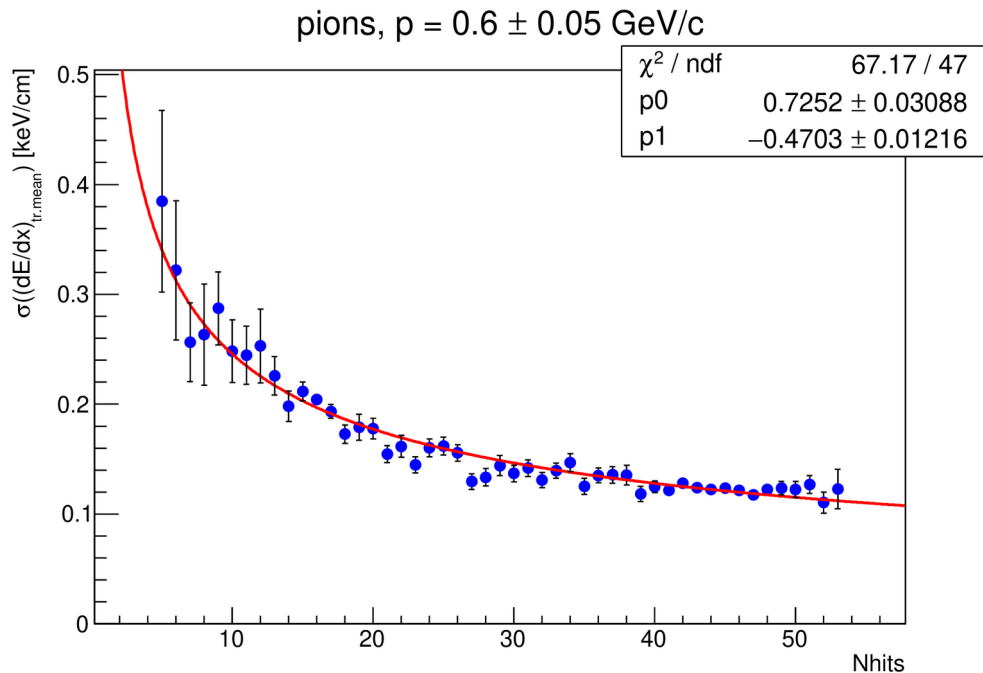
Mar 23, 2022

Straw tracker

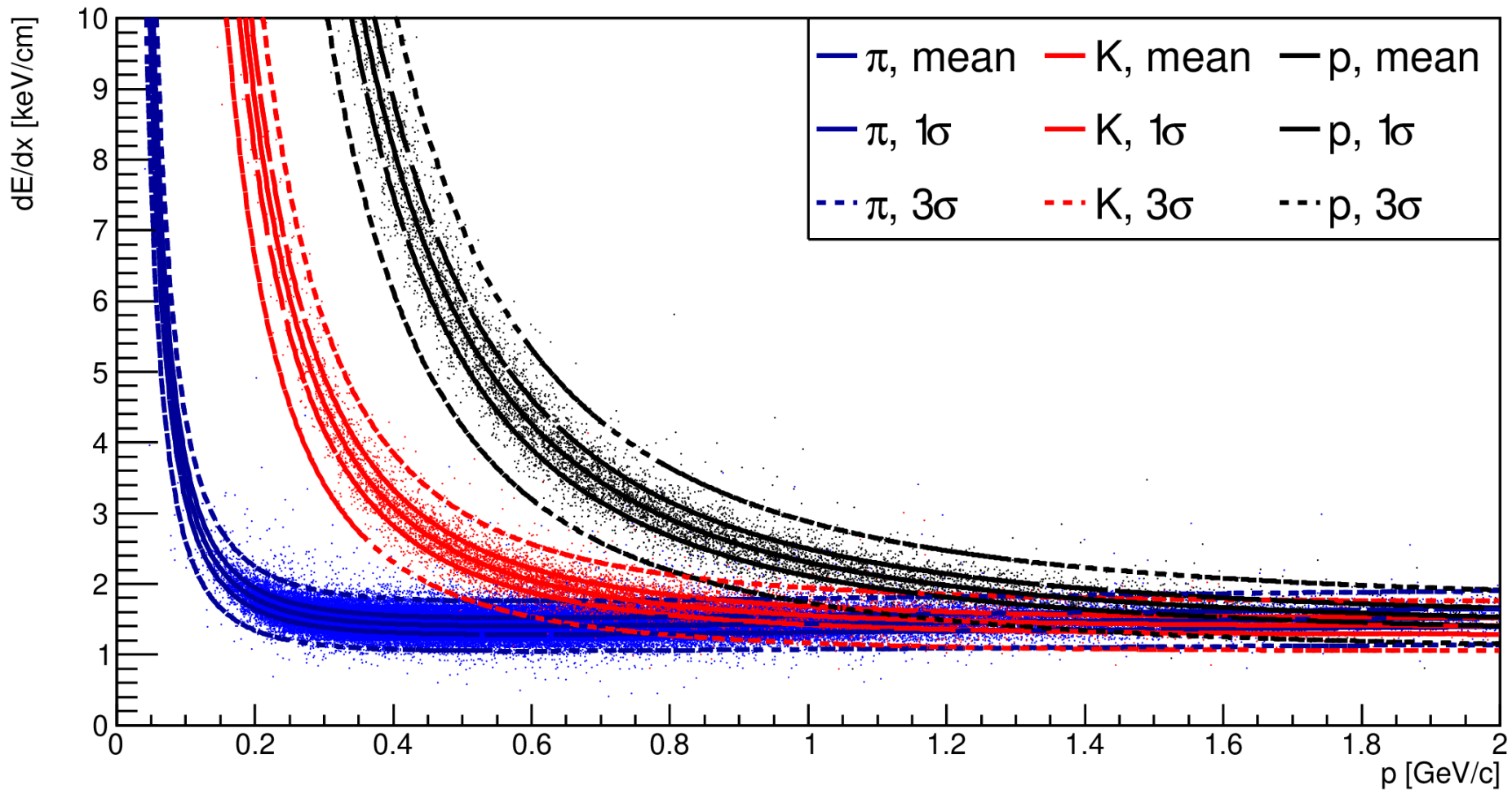
- **Old geometry:** 44 layers in barrel, 48 layers in endcaps
- **New geometry:** 44 layers in barrel, 16 layers in endcaps
- We use truncated mean dE/dx method for particle identification at low momenta. Dependence of its mean and sigma on momentum was presented in previous talks. However, sigma is also function of number of hits.

Dependence of $\sigma((dE/dx)_{\text{trunc.mean}})$ on number of hits

- Naive expectation: $\sigma \sim 1/\sqrt{N_{\text{hits}}}$

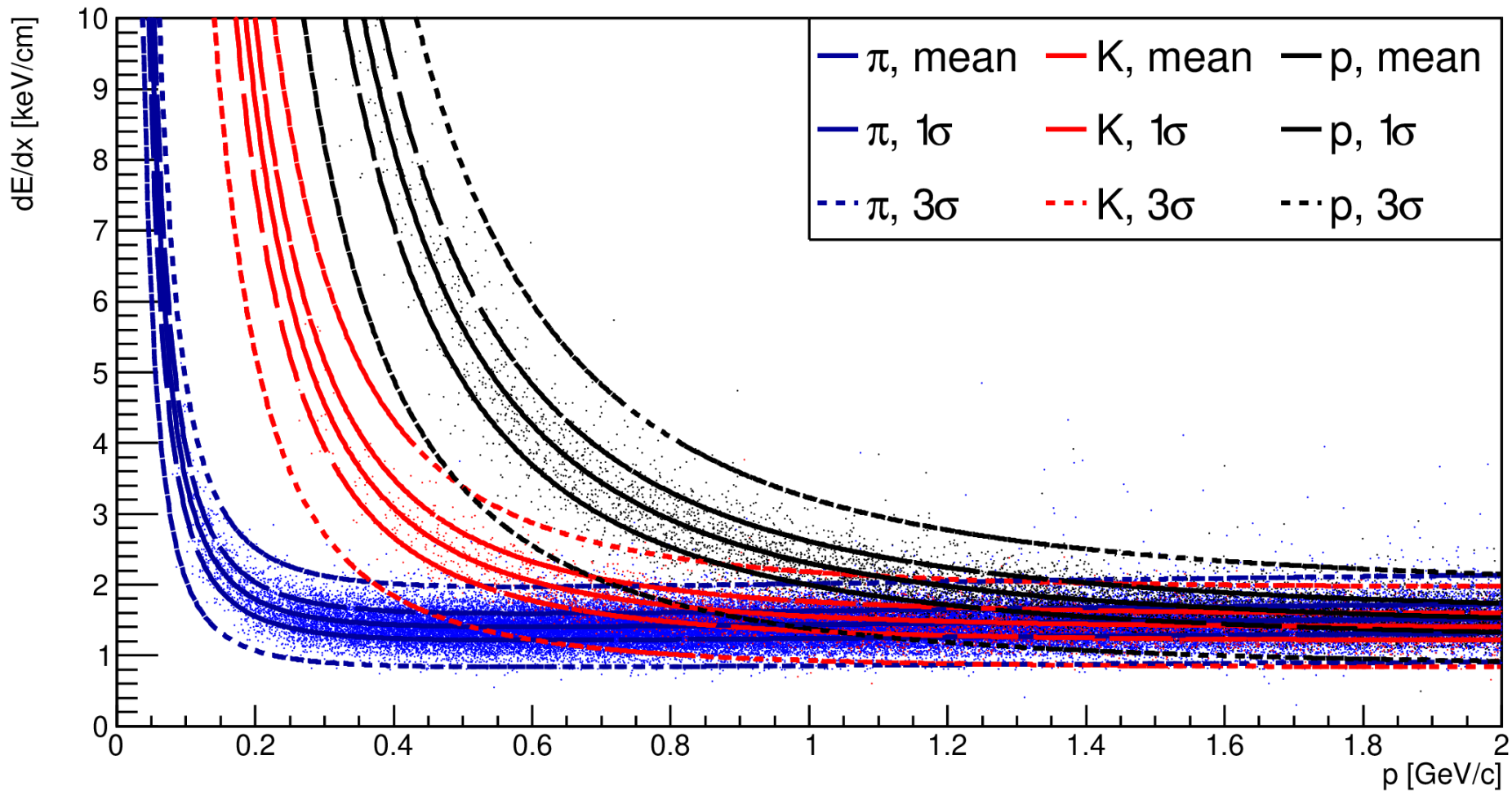


Truncated mean dE/dx vs momentum (BARREL ONLY)



pions separable from kaons up to ~ 0.6 GeV/c, from protons up to ~ 1.1 GeV/c

Truncated mean dE/dx vs momentum (ENDCAPS ONLY)



pions separable from kaons up to ~ 0.45 GeV/c, from protons up to ~ 0.85 GeV/c

Conclusions

- Sigma of truncated mean dE/dx distribution is approximately $\sim 1/\sqrt{N_{\text{hits}}}$
- Particle identification capability using this method is significantly reduced for endcaps in new geometry.