

Impact of dE measurement error on particle identification via dE/dx method

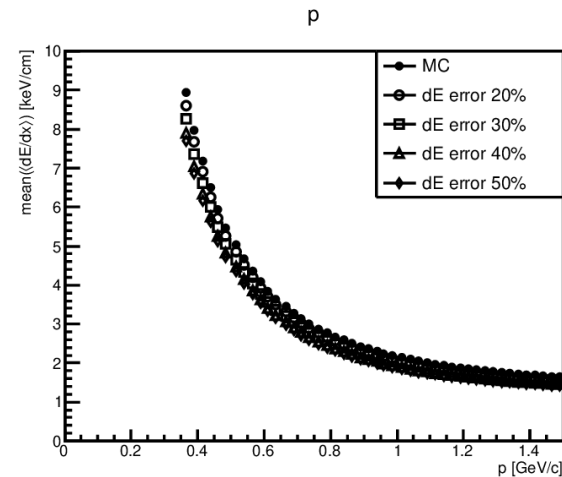
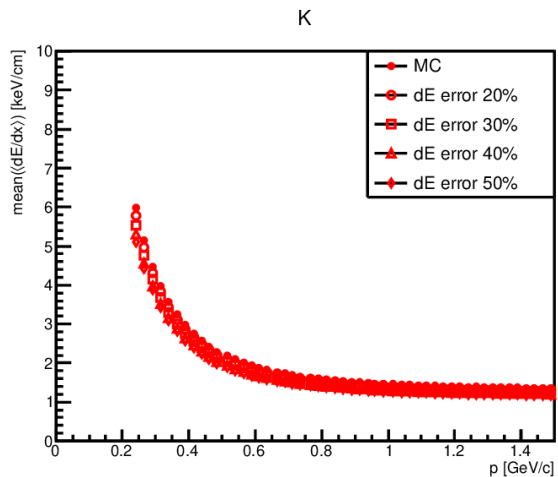
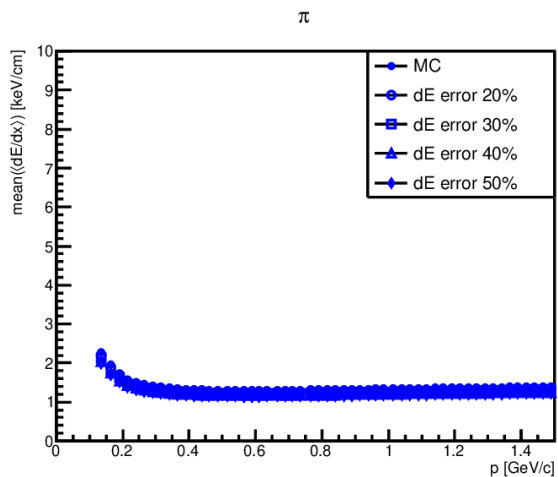
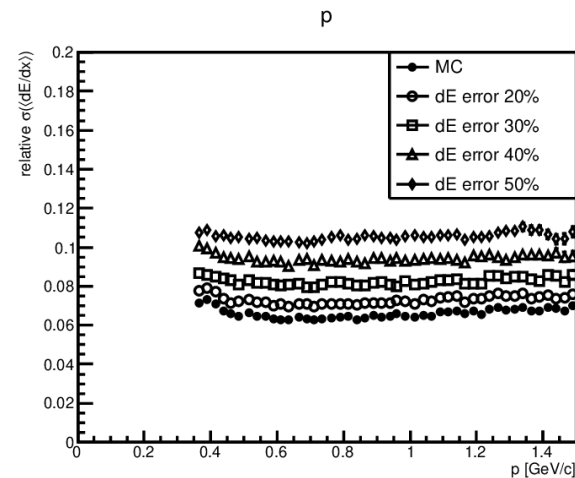
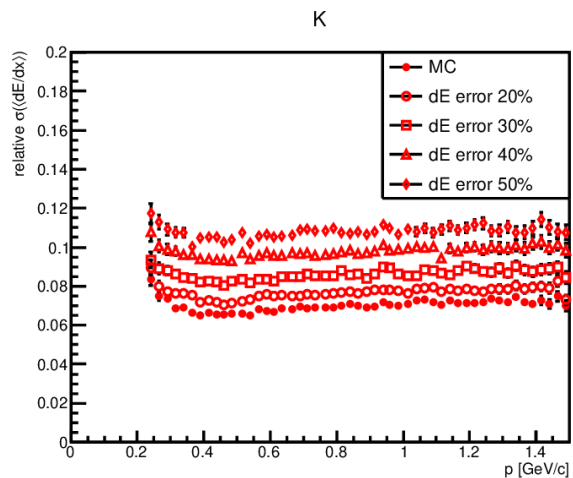
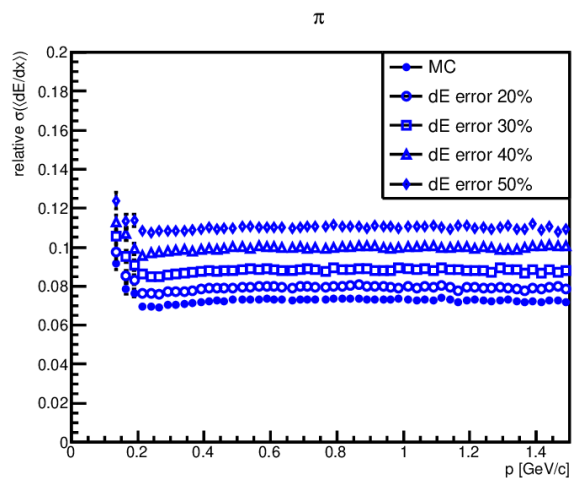
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LHEP JINR

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Mean and relative sigma of truncated mean dE/dx for different values of dE error

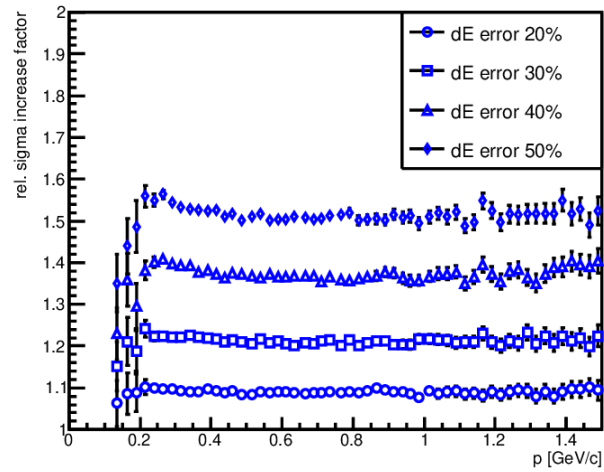
(Nhits B = 62 ± 2 , Nhits EC = 0)



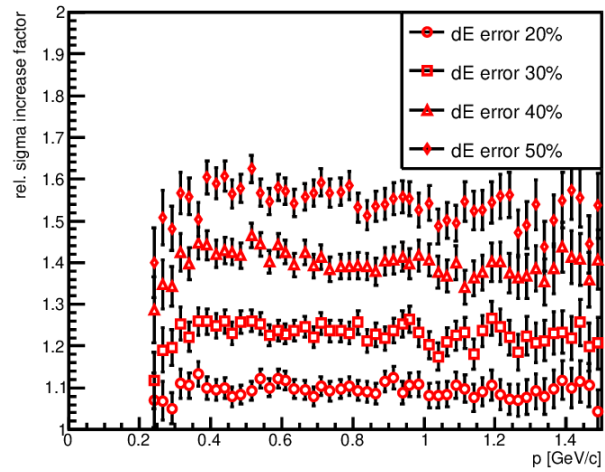
Increase factors of relative sigma of trunc. mean dE/dx for different values of dE error

(Nhits B = 62 ± 2 , Nhits EC = 0)

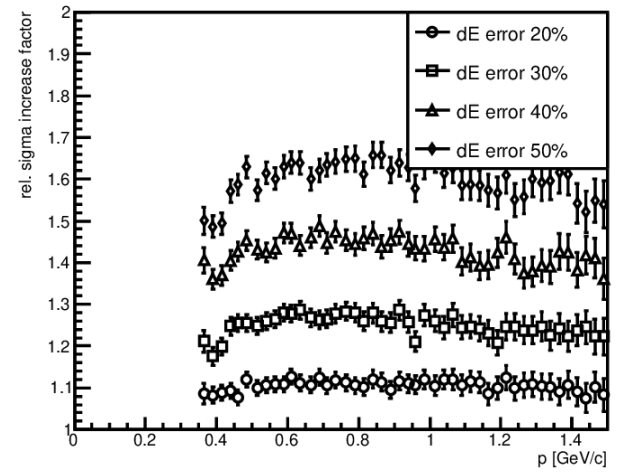
π



K

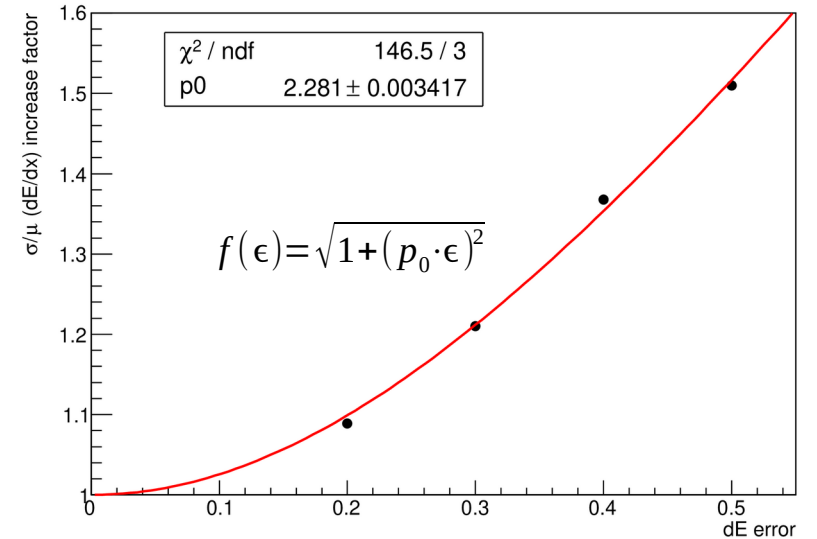


p

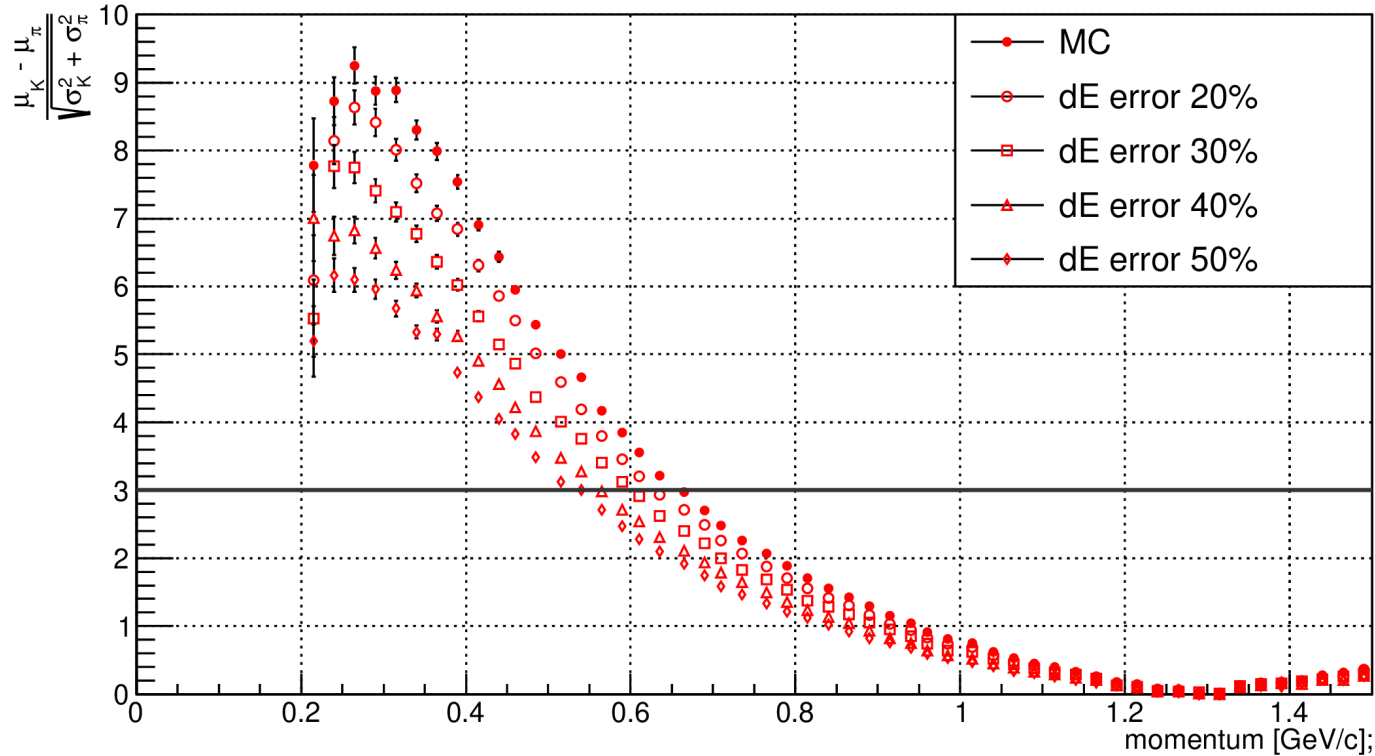


Increase factors of relative sigma of trunc. mean dE/dx for different values of dE error

| dE error | Relative sigma increase factor | | |
|----------|--------------------------------|-------|---------|
| | pions | kaons | protons |
| 20% | 1.09 | 1.10 | 1.11 |
| 30% | 1.21 | 1.23 | 1.25 |
| 40% | 1.37 | 1.40 | 1.43 |
| 50% | 1.51 | 1.55 | 1.60 |

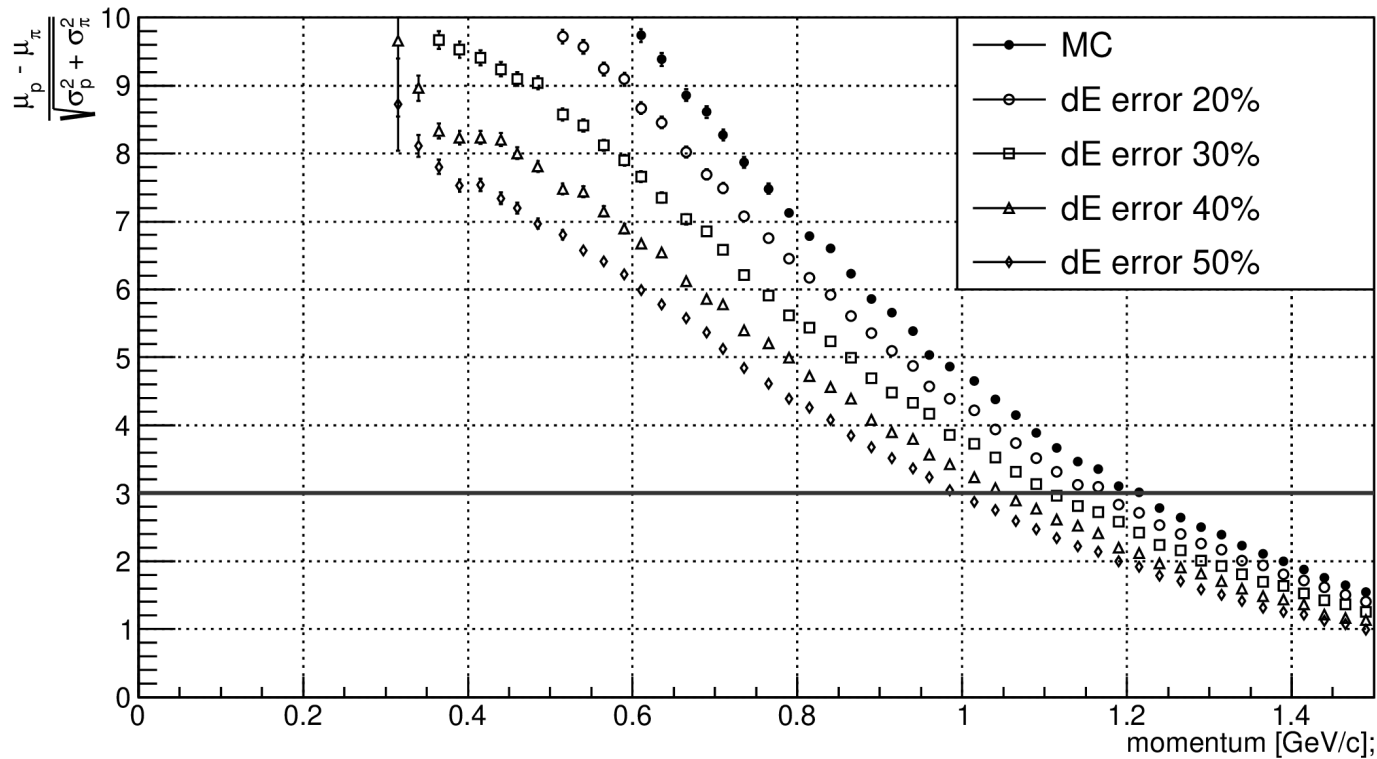


Pions vs kaons separation $\left(\frac{\Delta\mu}{\sigma} = \frac{|\mu_K - \mu_\pi|}{\sqrt{\sigma_\pi^2 + \sigma_K^2}}\right)$



| dE error | $p: \Delta\mu/\sigma = 3$ [GeV/c] |
|----------|--------------------------------------|
| 0 | 0.66 |
| 20% | 0.63 |
| 30% | 0.60 |
| 40% | 0.56 |
| 50% | 0.54 |

Pions vs protons separation $\left(\frac{\Delta\mu}{\sigma} = \frac{|\mu_p - \mu_\pi|}{\sqrt{\sigma_\pi^2 + \sigma_p^2}}\right)$



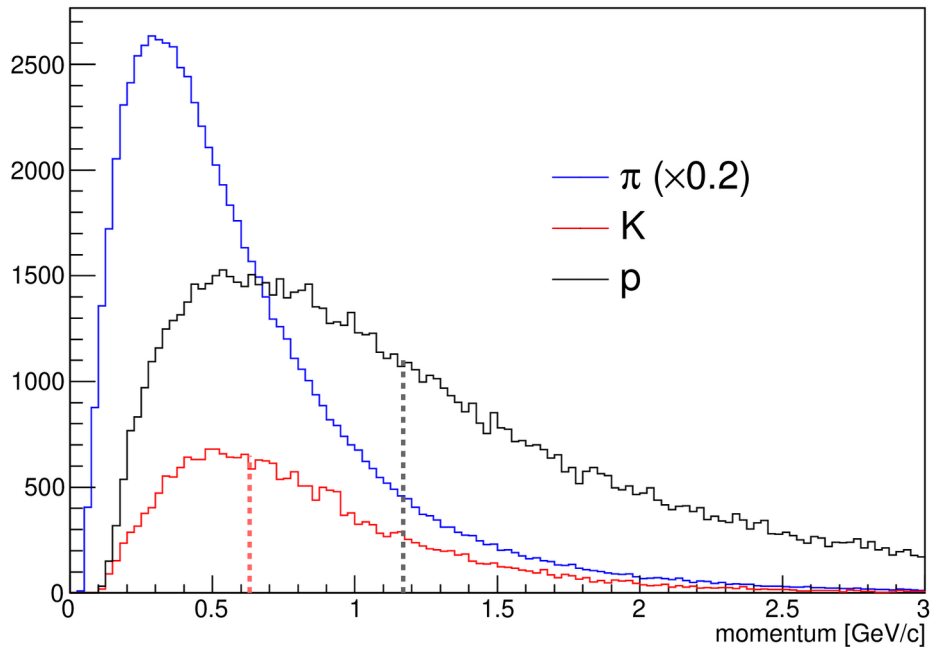
| dE error | p : $\Delta\mu/\sigma = 3$ [GeV/c] |
|----------|---|
| 0 | 1.22 |
| 20% | 1.17 |
| 30% | 1.11 |
| 40% | 1.05 |
| 50% | 0.99 |

Summary

| dE error | σ / μ increase factor (π) | momentum, up to which are distinguished: | |
|----------|--|---|--------------|
| | | π from K | π from p |
| 0 | 1 | 0.66 | 1.22 |
| 20% | 1.09 | 0.63 | 1.17 |
| 30% | 1.21 | 0.60 | 1.11 |
| 40% | 1.37 | 0.56 | 1.05 |
| 50% | 1.51 | 0.54 | 0.99 |

Momentum distributions

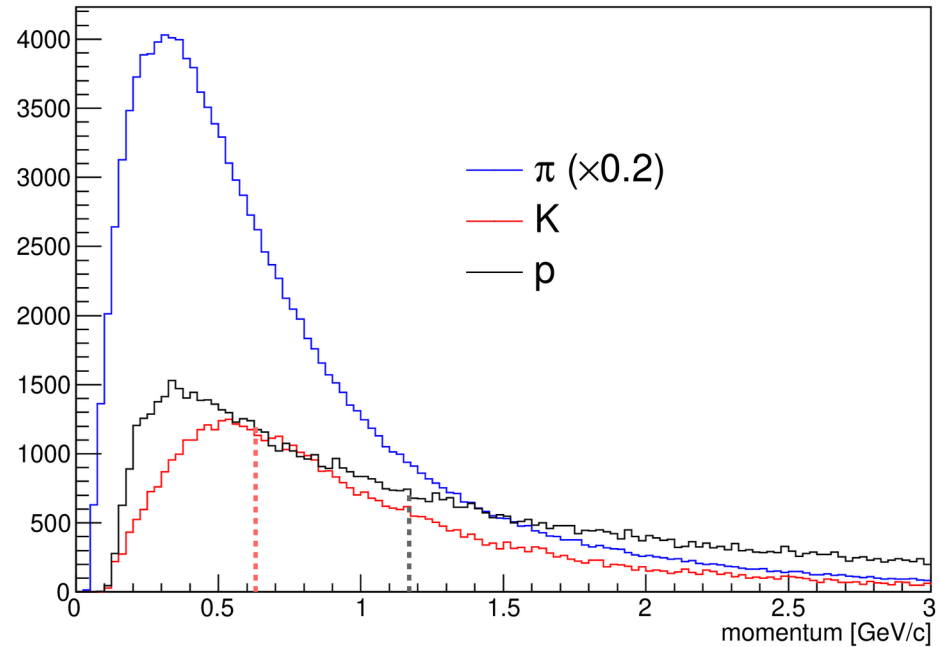
$\sqrt{s}=9.4\text{ GeV}$



$$\frac{N(\text{kaons: } p < 0.63)}{N(\text{kaons})} = 0.42$$

$$\frac{N(\text{protons: } p < 1.17)}{N(\text{protons})} = 0.53$$

$\sqrt{s}=27\text{ GeV}$



$$\frac{N(\text{kaons: } p < 0.63)}{N(\text{kaons})} = 0.36$$

$$\frac{N(\text{protons: } p < 1.17)}{N(\text{protons})} = 0.5$$