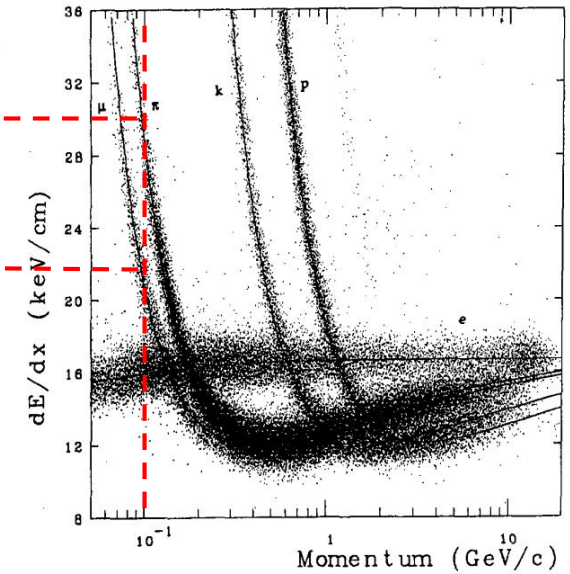
Večkratno merjenje specifične ionizacije

Bethe-Bloch:

<dE/dX>$_\pi$

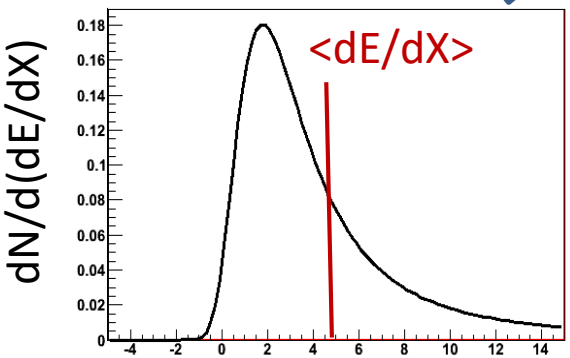
<dE/dX>$_\mu$



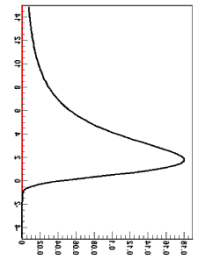
Zaradi Landau-jeve porazdelitve (repi) se natančnost določanja <dE/dX> pri večkratnih merjenjih (N) ne manjša kot 1/√N:

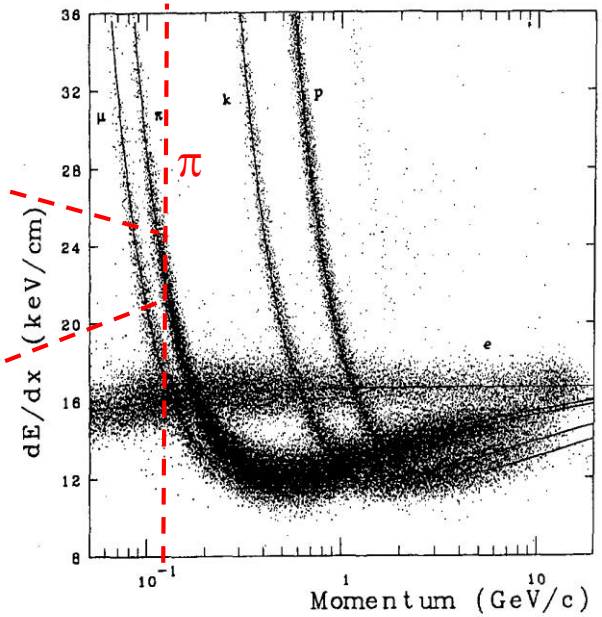
Bethe-Bloch:

Landau:

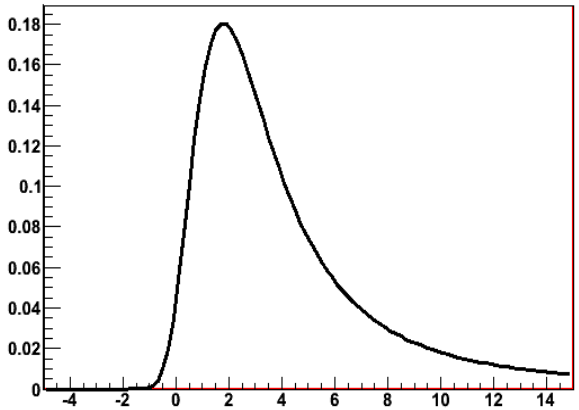


dE/dX
(arbitrary units)

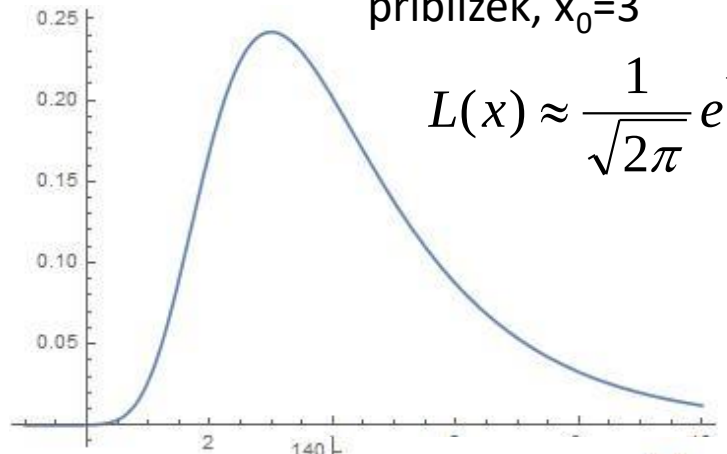




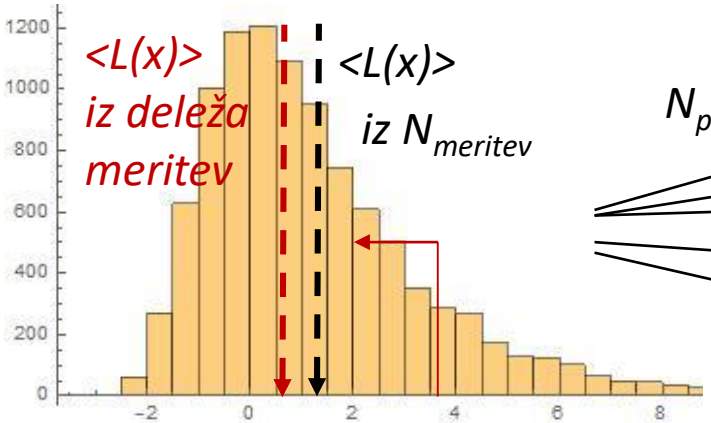
Landau-ova porazdelitev



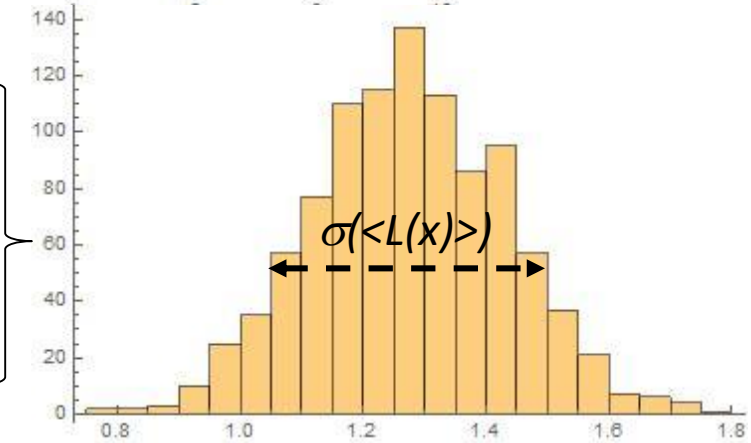
približek, x_0=3



$$L(x) \approx \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\left((x-x_0)+e^{-(x-x_0)}\right)}$$

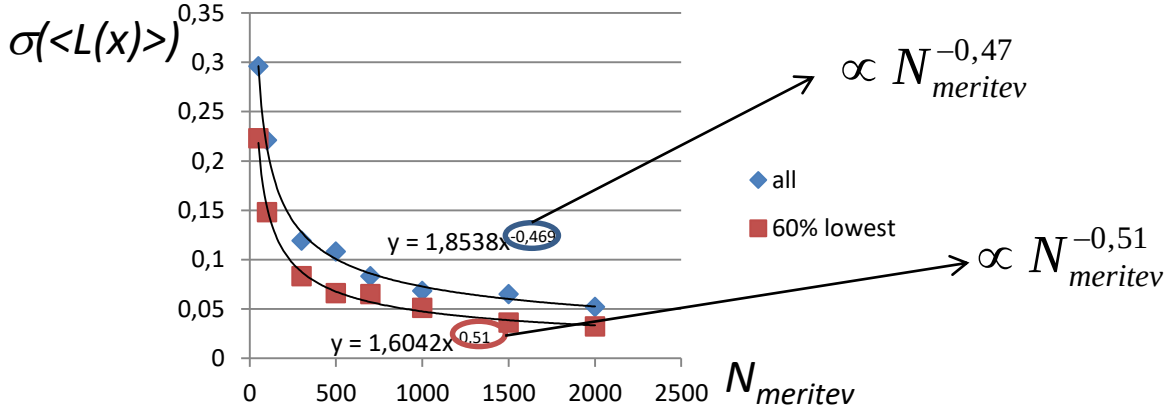


$N_{poskusov}$



naključno generiranje po *L(x)* z x_0=0

porazdelitev večjega števila *<L(x)>* z x_0=0



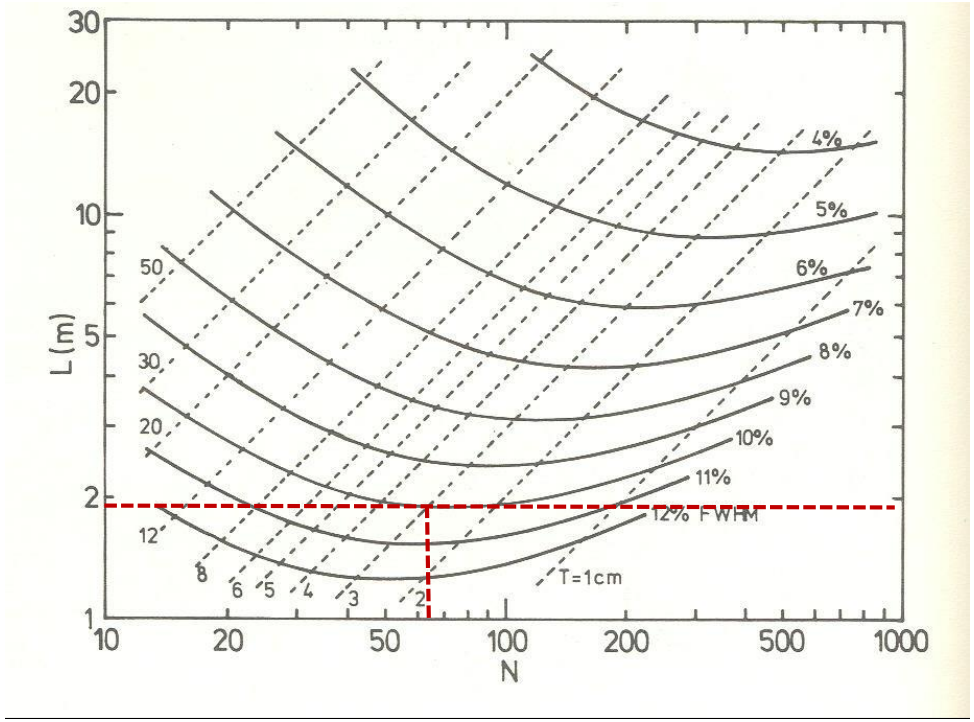
$$\propto N_{meritev}^{-0,47}$$

$$\propto N_{meritev}^{-0,51}$$

Večkratno merjenje specifične ionizacije

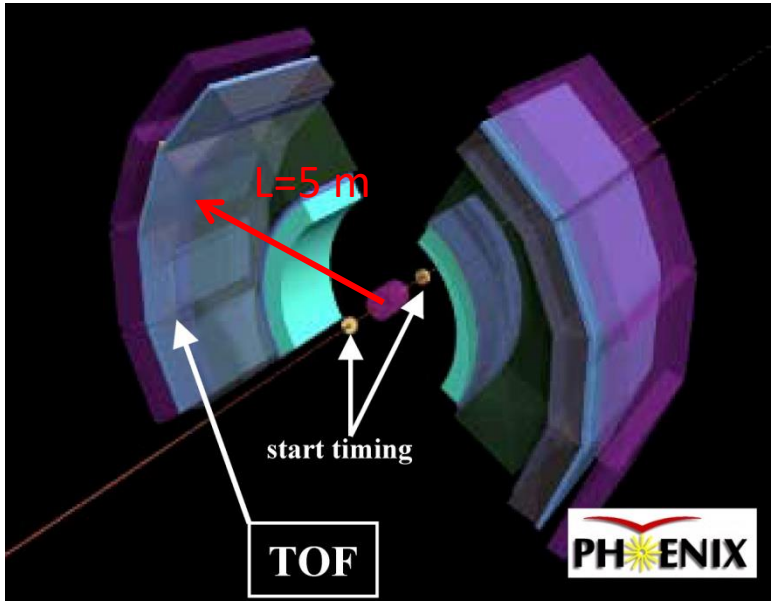
Optimalno št. meritev:
(pri dani L)

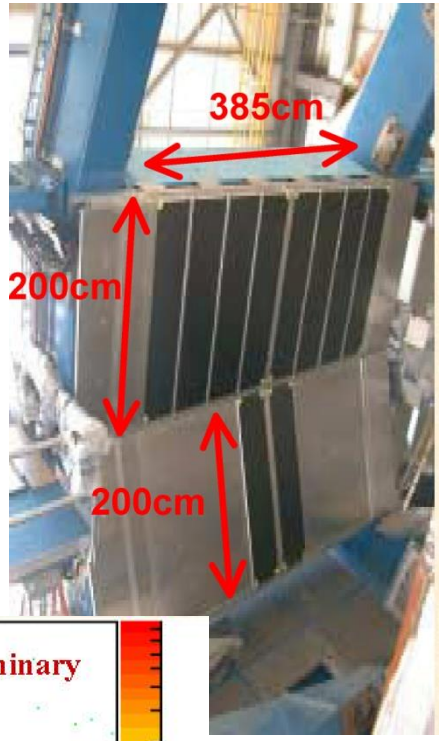
Ar pri standardnih pogojih;
za L ~1,95 m
$\Rightarrow$
N ~ 65 (T=3 cm)
FWHM ~ 10%

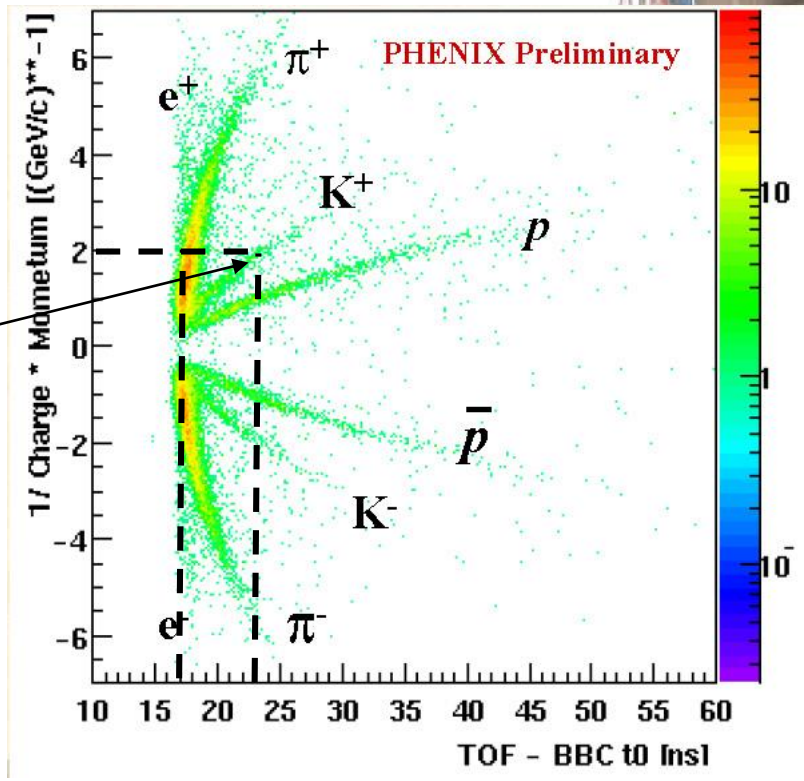


Merilec časa preleta

primer: detektor Phenix, BNL
trki težkih ionov, študij plazme kvarki-gluoni





$$t = \frac{L}{c}\sqrt{1+\frac{m^2c^2}{p^2}}$$

$m_K c^2$=0,494 GeV, cp=0,5 GeV, L=5m
$\Rightarrow$ t=23 ns
$m_\pi c^2$=0,14 GeV, cp=0,5 GeV, L=5m
$\Rightarrow$ t=17 ns