PWG meeting
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First tests of production with vHLLE model

Konstantin Mikhaylov (ITEP & JINR),
Ludmila Malinina(SINP MSU & JINR),
Pavel Batyuk (JINR),
Grigory Nigmatkulov (MEPhI)

Outline

- small test : AuAu 11.5 GeV, 1000 events vHLLE+UrQMD model (1PT & XPT), LOSS=1 (standart for MPD root now)

- Some questions / suggestions for the large production

- Particle identification in TOF & TPC

- Discussion of some problems with dEdx(p)

Some questions / suggestions for the large production

первичные треки (из первичной вершины) не пишутся в MpdDst (вершина восстанавливается, а треки перефитированные в первичную вершину не пишутся),

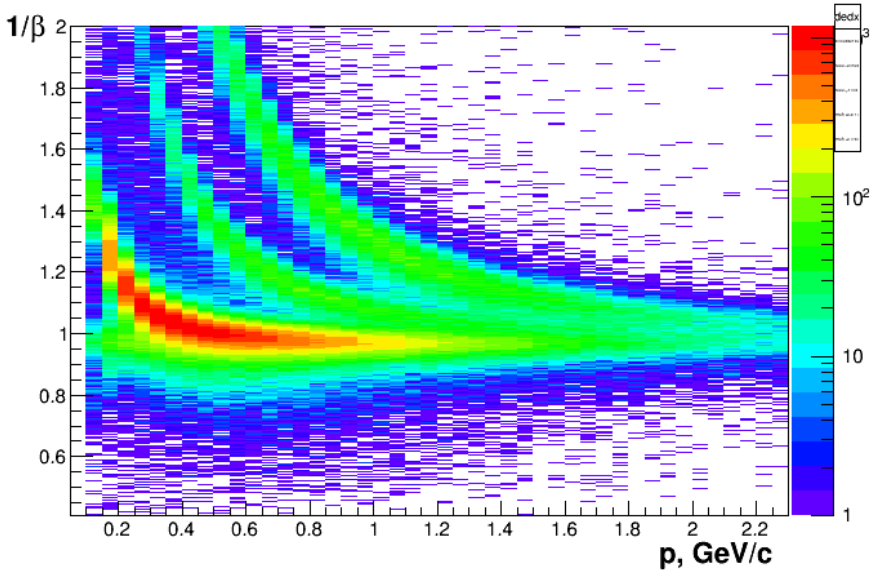
nSigma(e,pi,K,p) записаны в Int_t,

dEdx измеряется в ADC, а не в GeV/cm или KeV/cm

TOF response

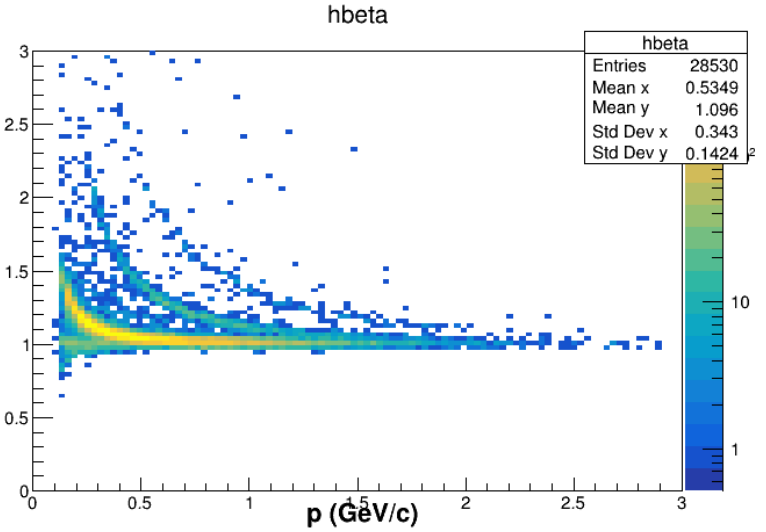
MPD, previous simulations

VHLLE generator, Tracks: N clusters>20



MPD, production aug.2019

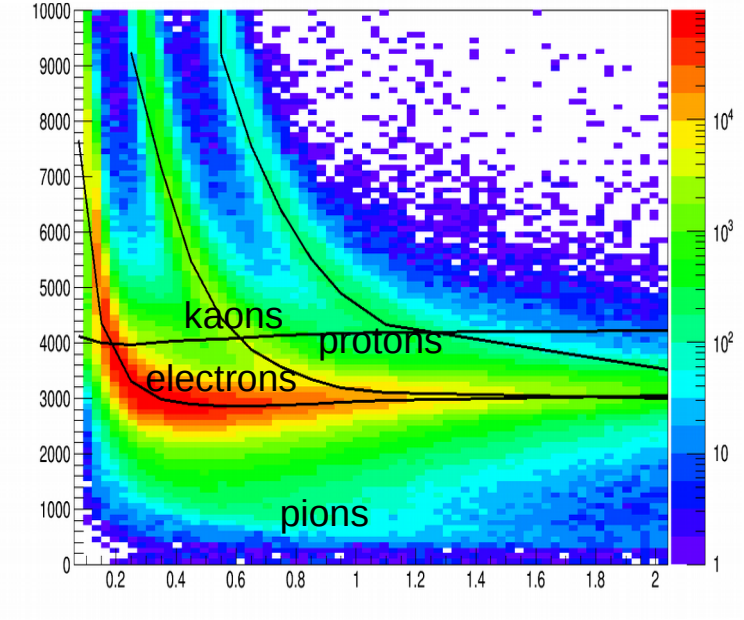
VHLLE generator, Tracks: N clusters>20



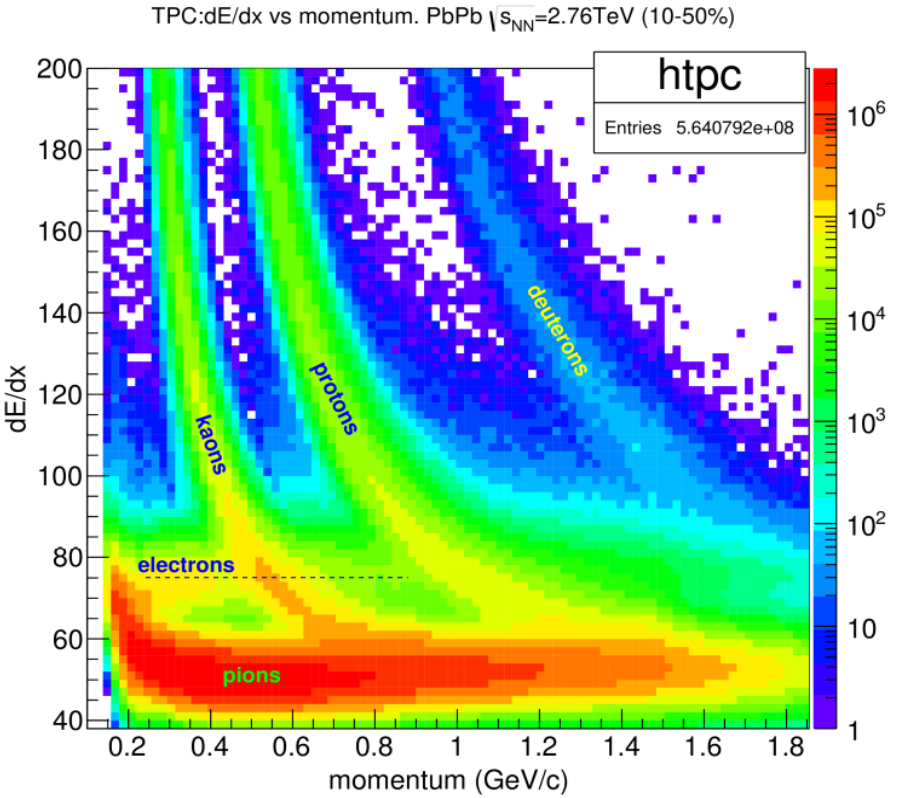
Particle Identification by TPC energy loss

MPD, previous simulations

VHLLE generator, Tracks: N clusters>20



ALICE



MPD, production aug.2019

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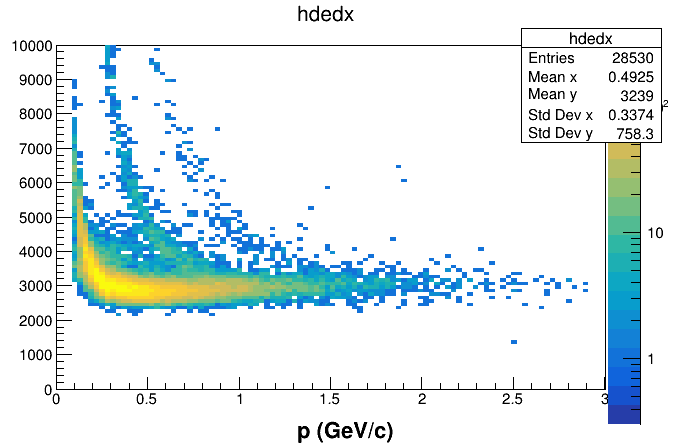
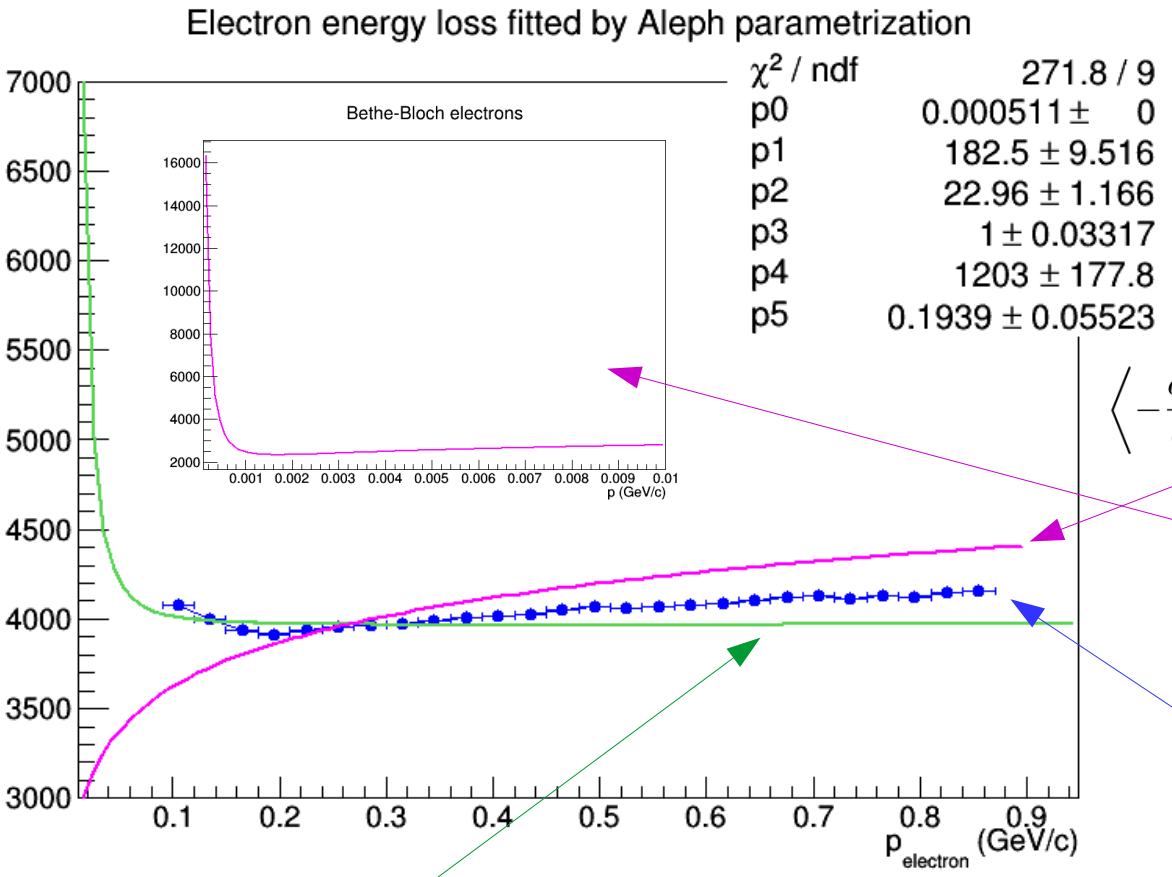


The same problem as in the old simulation:
dedx lines are not in correct places,
Especially for electrons

Problem with electrons



$$\left\langle -\frac{dE}{dx} \right\rangle = Kz^2 \frac{Z}{A} \frac{1}{\beta^2} \left[\frac{1}{2} \ln \frac{2m_e c^2 \beta^2 \gamma^2 W_{\max}}{I^2} - \beta^2 - \frac{\delta(\beta\gamma)}{2} \right]$$

Energy loss for electrons should go down with decreasing momentum down to 1 MeV/c

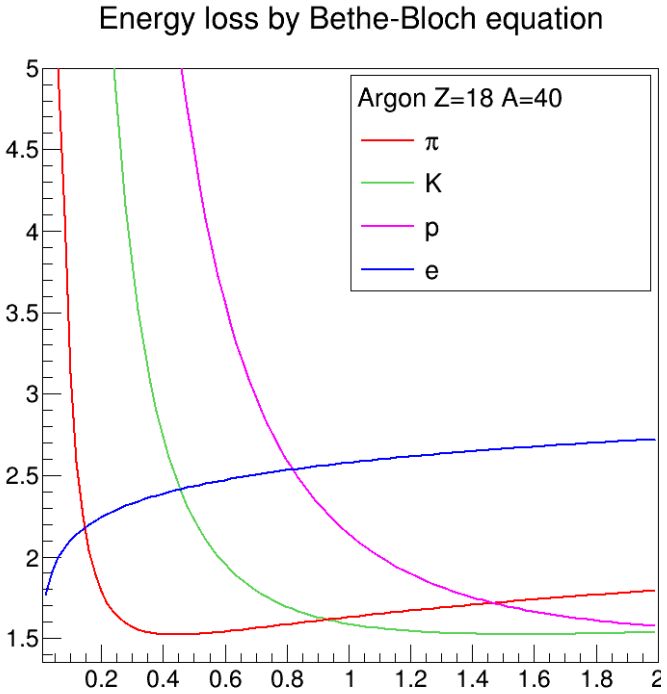
MC data

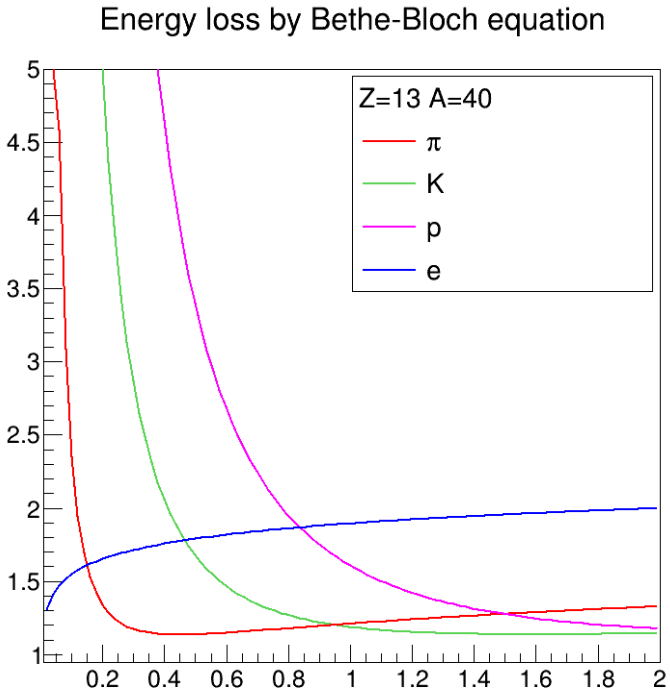
We can't fit electrons by Aleph: $f(\beta\gamma) = \frac{P_1}{\beta^{P_4}} \cdot \left\{ P_2 - \beta^{P_4} - \ln \left[P_3 + \frac{1}{(\beta\gamma)^{P_5}} \right] \right\},$

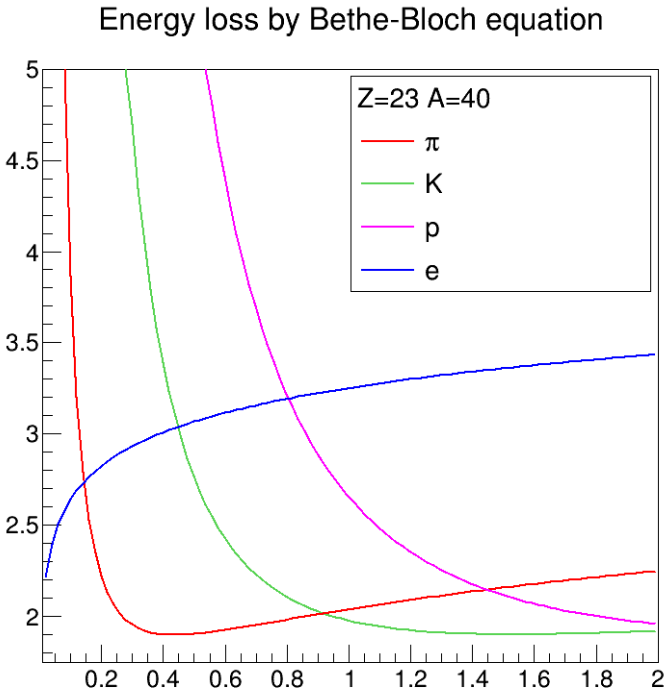
Energy loss by Bethe-Bloch equation

To estimate <dE/dx> by BB equation Ar was used (STAR: 90%Ar+10%CH_4)

The intersection curves weakly dependent on the gas mixture (vary Z ± 5)





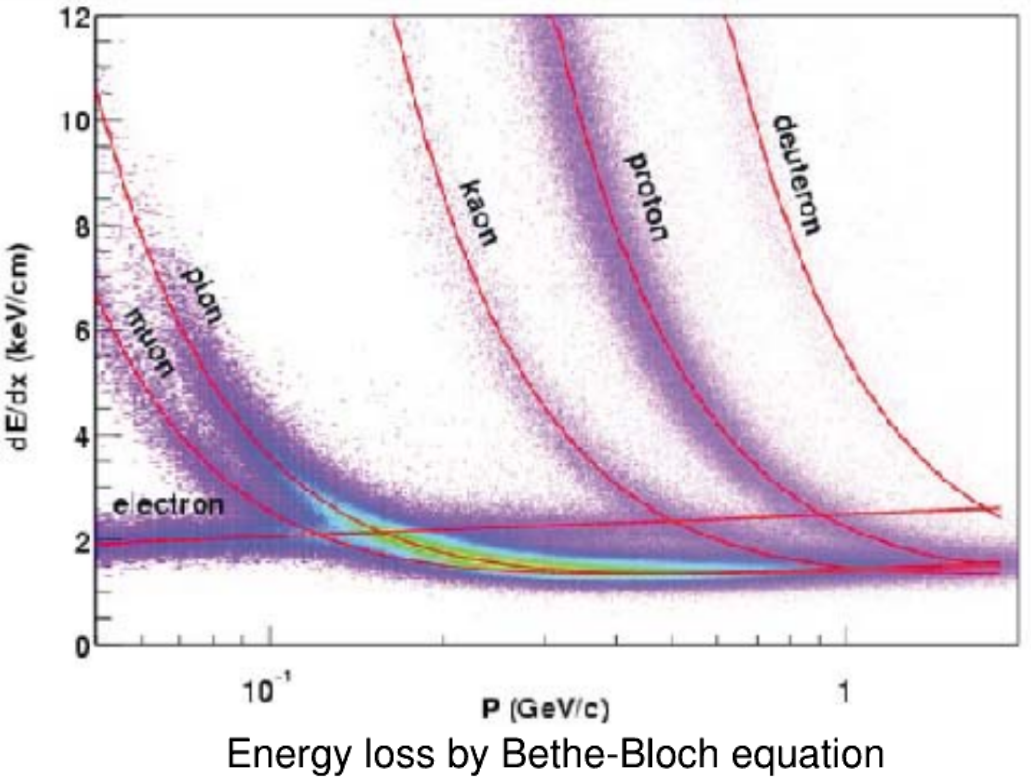


The intersection of K and electrons is about momentum 450 MeV/c

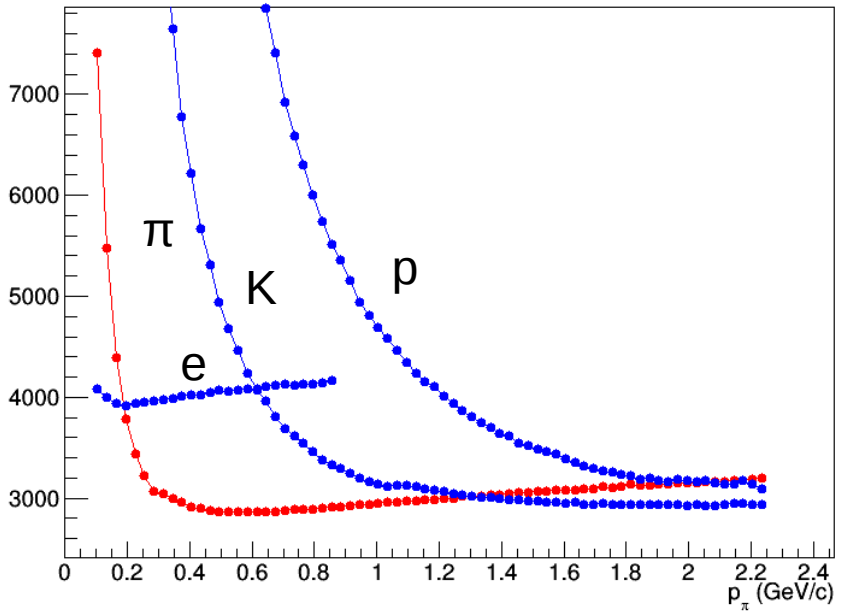
STAR and BBF calculations

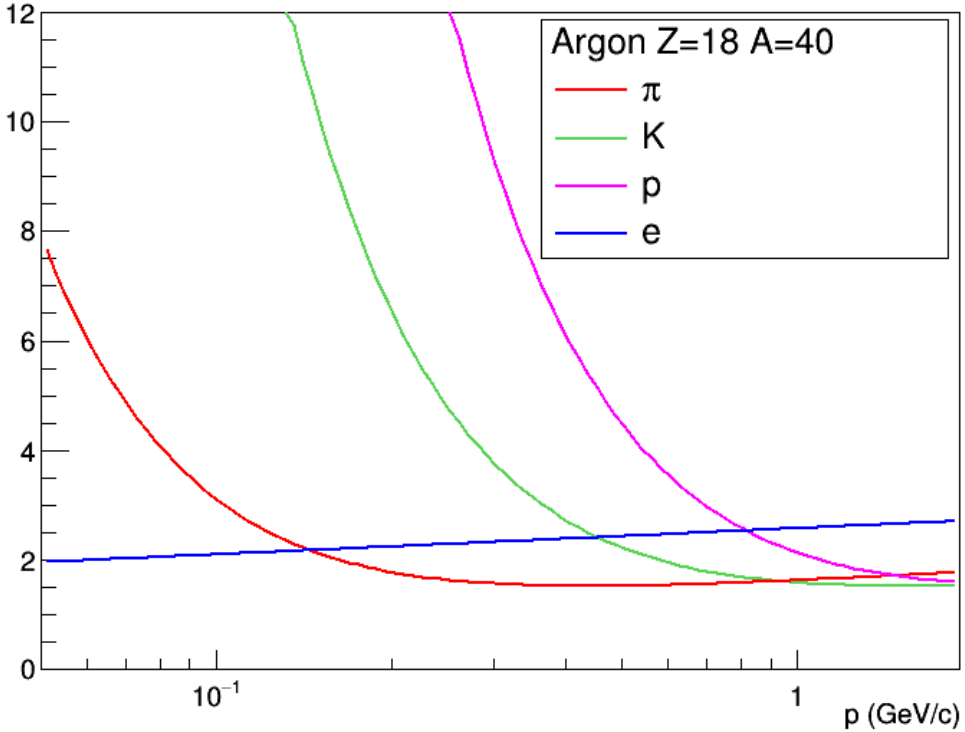
The intersection of e and K curves for ALICE & STAR and BBF calculations are at about 0.45 GeV/c

MPD at 0.6 GeV/c : Why ???



Energy loss by Bethe-Bloch equation





ALICE algorithm to calculate dEdx

After discussions with Igor Rufanov, Alexander Zinchenko and Veronika Vasendina:

GEANT3 standard configuration (LOSS=1,2) is not optimal for MPD dEdx simulations:

-Create MC hits only when crossing boundaries between different media or when reaching a certain energy loss threshold
-Soft energy loss from tables + Landau-Vavilov straggling

Particle transport in “Geant3 in ALICE mode” : LOSS=5 (gfluct.F) +
(from Felix Böhmer presentation)

GEANT3 ALICE:

- Sample next steplength L from from pdf $f(x) = \frac{1}{\lambda} exp^{(-\frac{x}{\lambda})}$

  $L = -\lambda ln(r)$ (λ: mean free path, r: random number $\in$ [0,1])
- Force GEANT to make a step there
- $\lambda(p) \propto (\frac{dE}{dx})^{-1}$ from normalized Bethe-Bloch parameterization
- Energy loss directly obtained from a tuned Rutherford cross section
  `[ B. Lasiuk, NIM A409, 402-406 ]`

We are waiting for some changes in MPD root – then next production with LOSS=5