First look at sampling calorimeter

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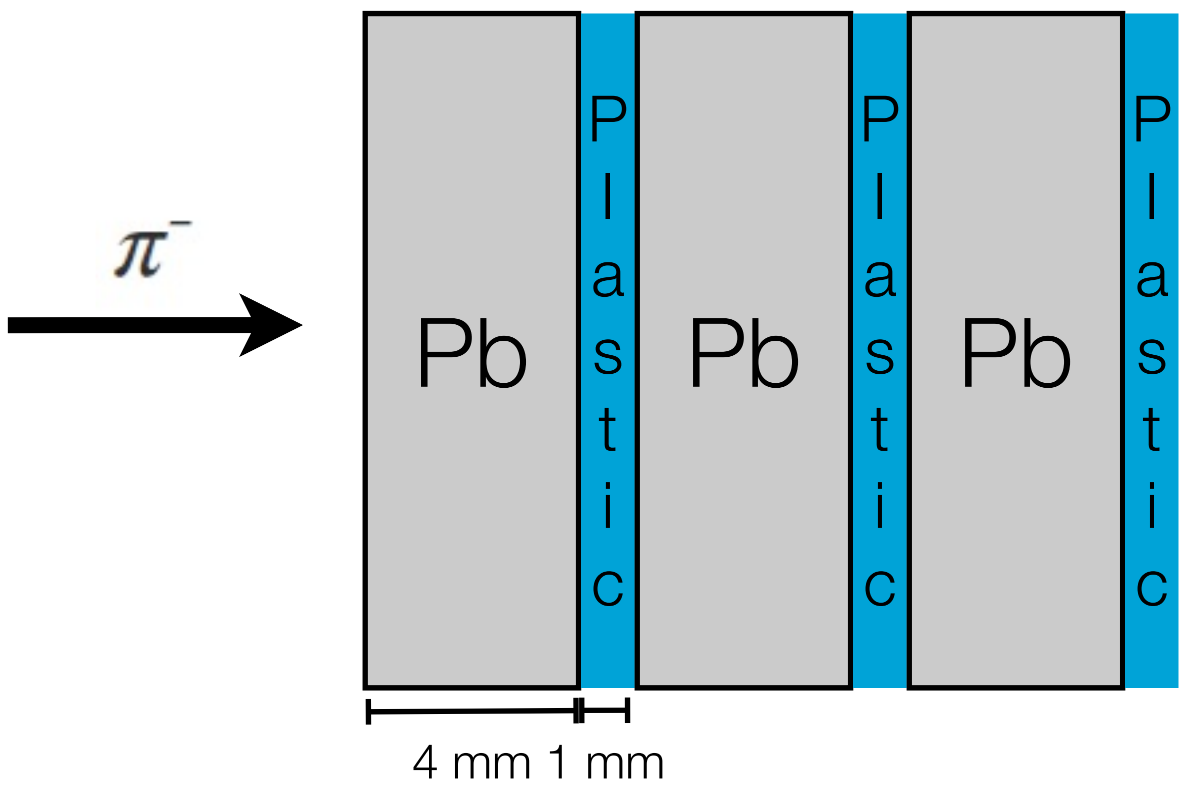
Why?

- This detector geometry seems to be the preferred choice in currently available sampling calorimeters.
- This way we can compare simulation results with experimental results.
- We study the calorimeter response as a function of energy of incoming particle, more particularly:
  - Linearity of response,
  - Ratio of scintillation/absorber response to explore how sampling affects calorimeter resolution.

Sampling calorimeter



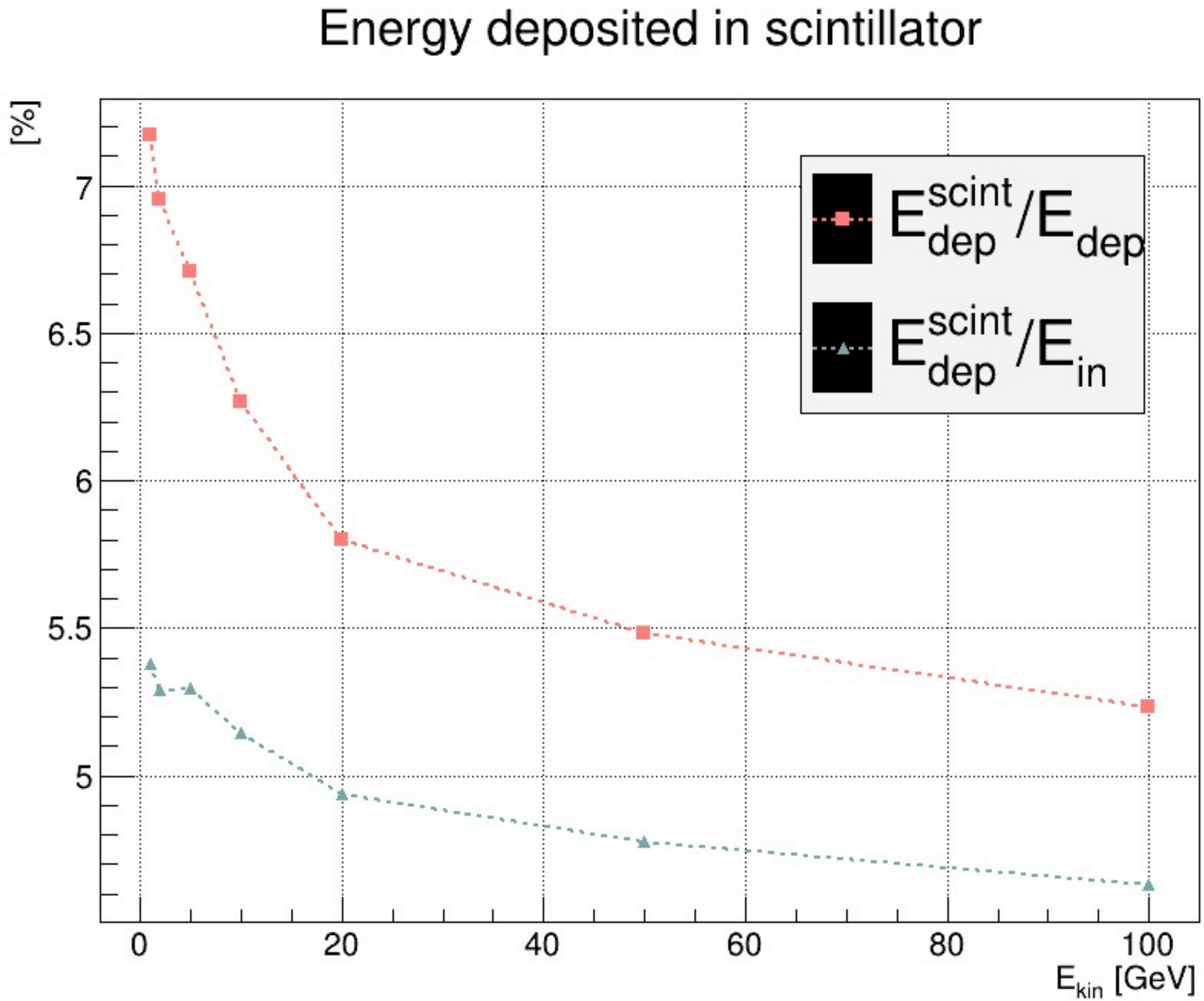
Material Specifics:

Pb:

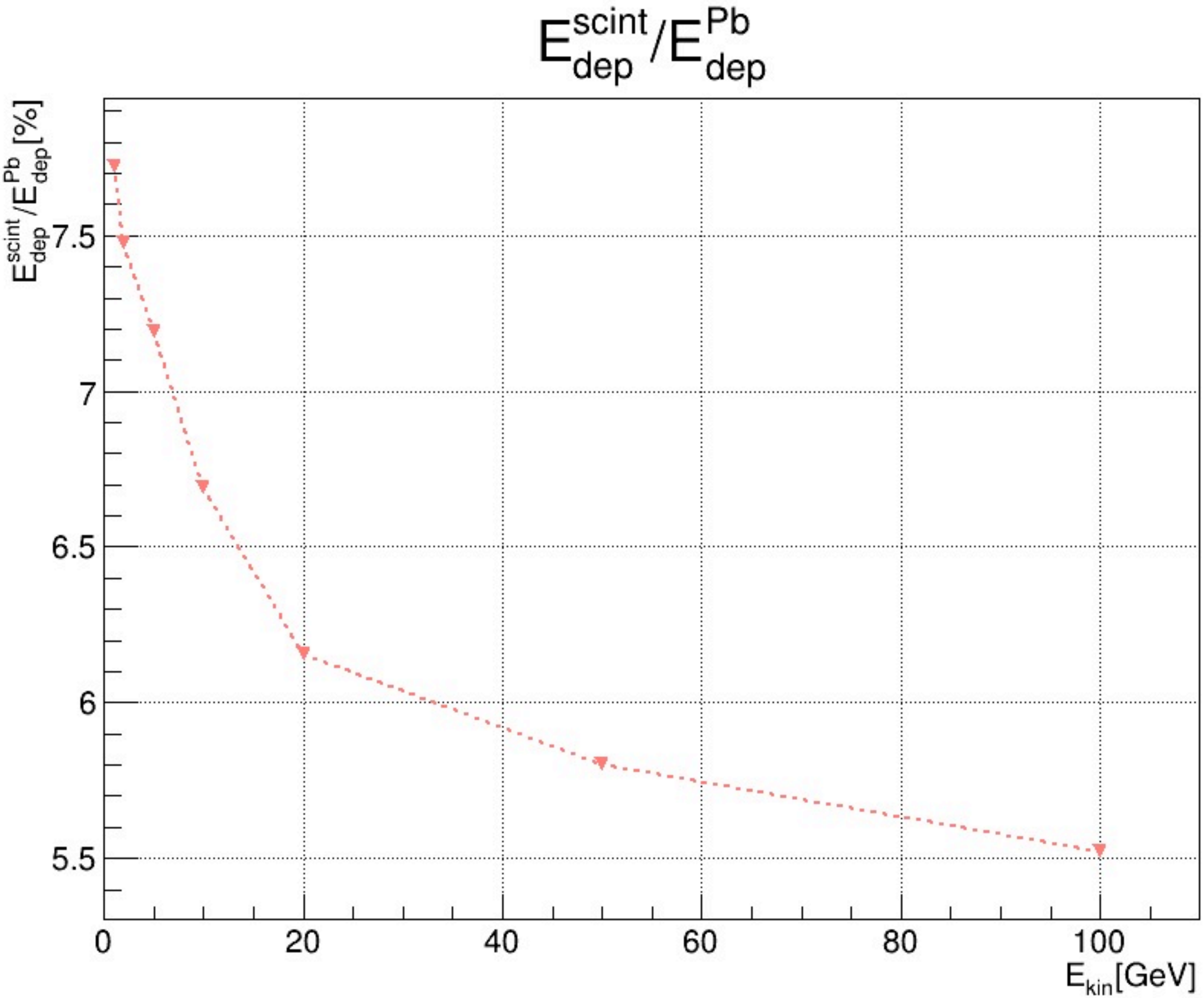
$Z=82, A=207.2, \varrho=11.34 g/cm^3$

Plastic scintillator:

$C_9H_{10} \quad \varrho=1.032 g/cm^3$

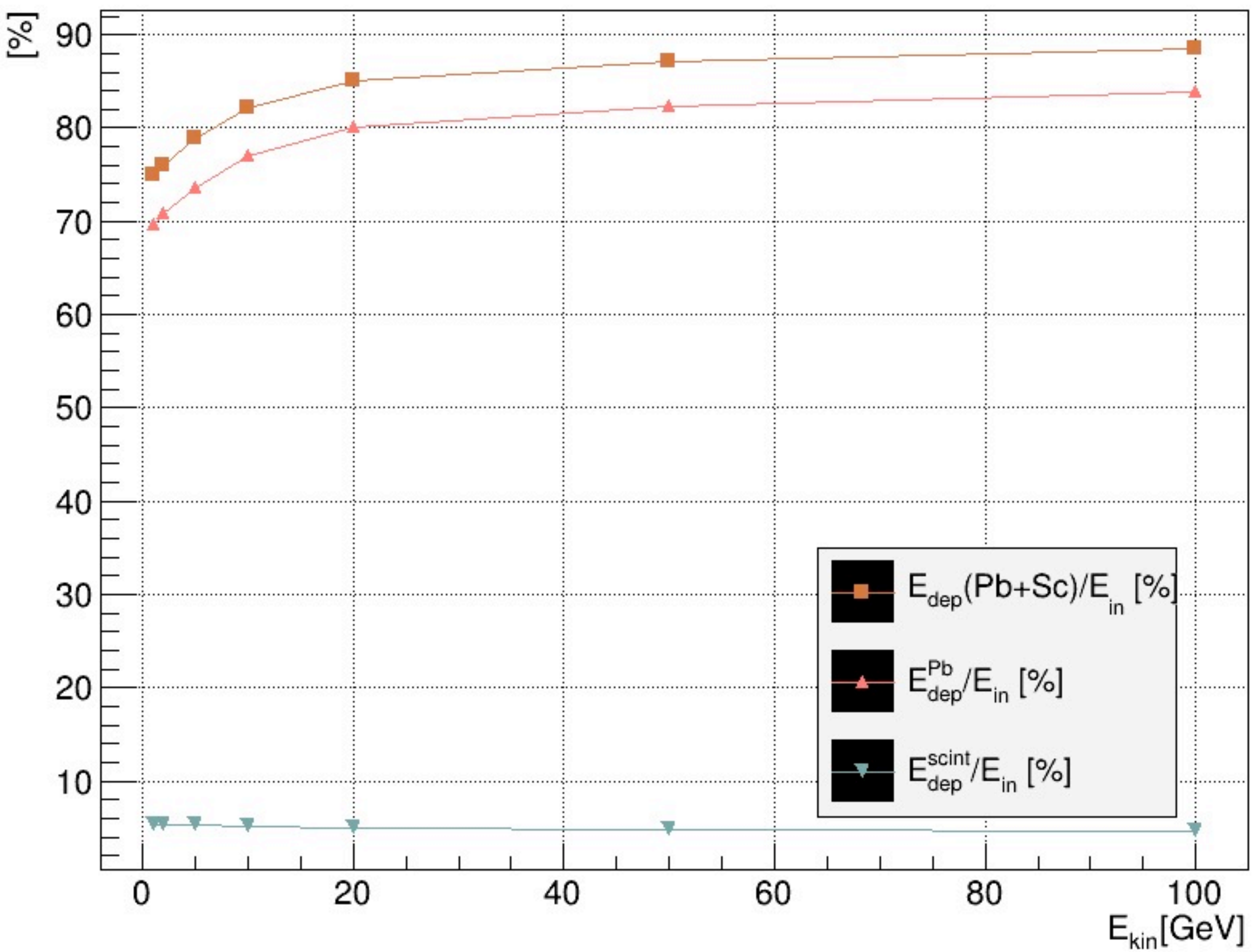


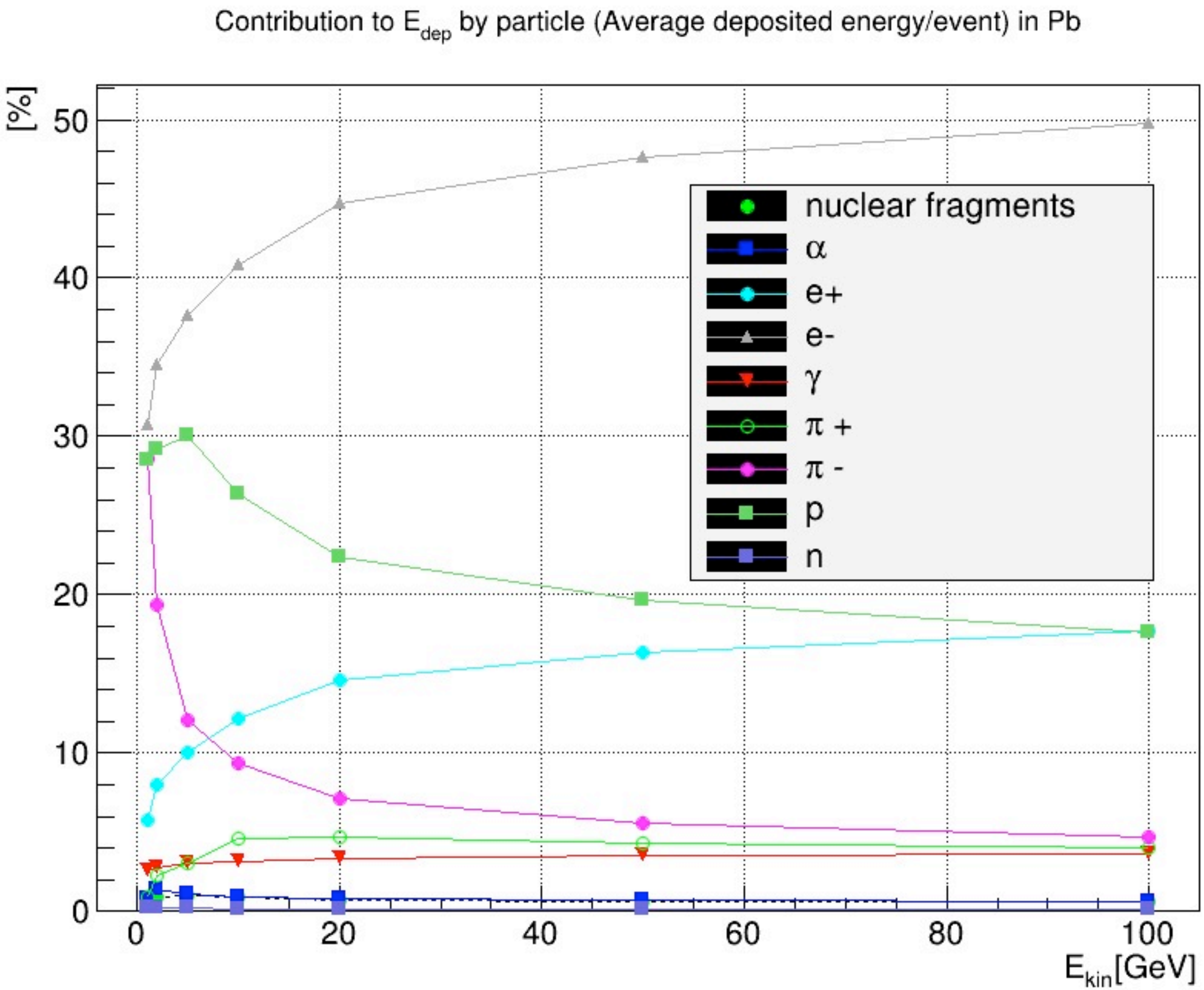
Here: $E_{in}=E_{kin}+m_{\pi^-}(0.1395\ GeV)$



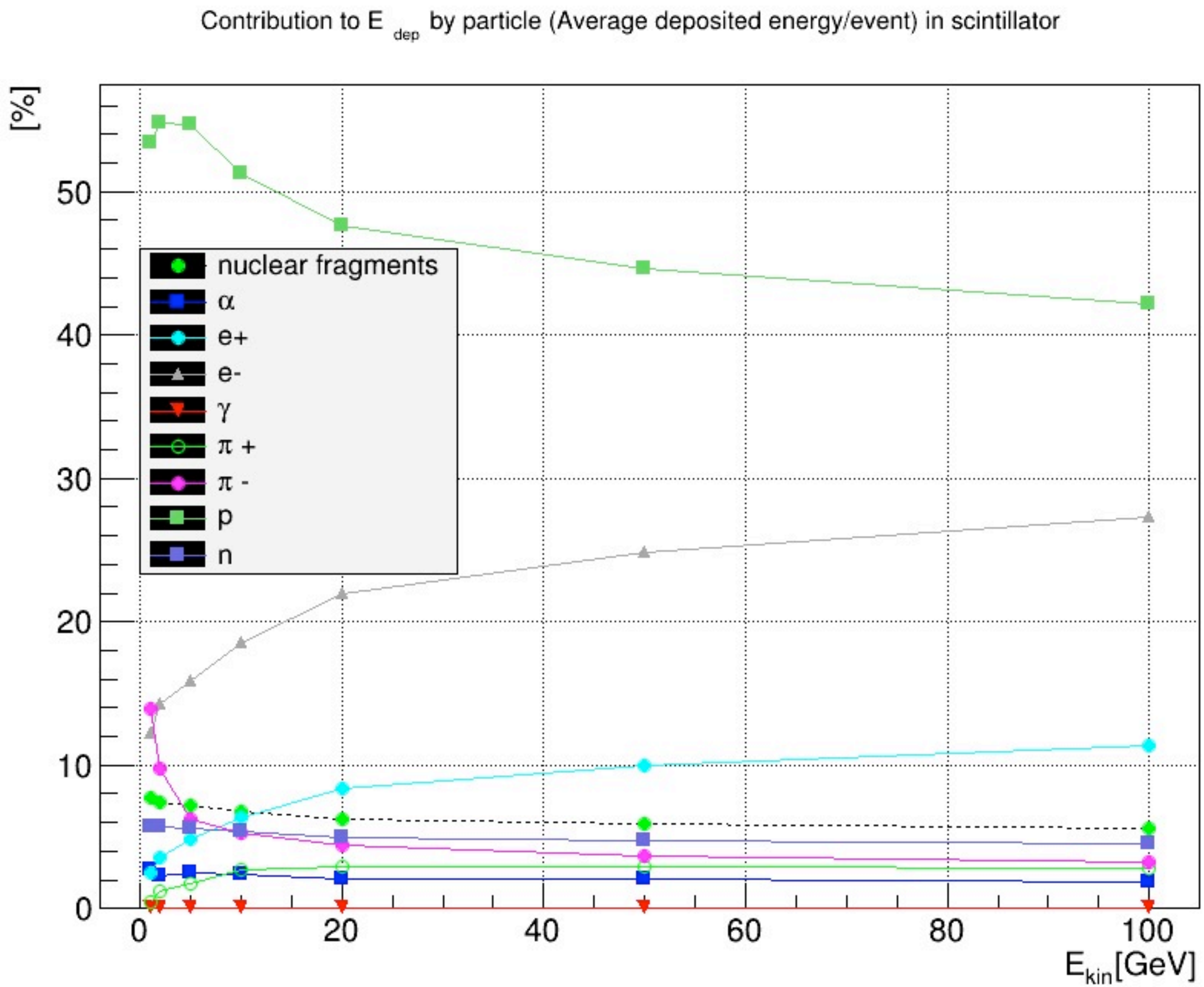
$E_{dep}^{scint}/E_{dep}^{Pb}$
$E_{dep}^{scint}/E_{dep}^{Pb}$ [%]
7.5
7
6.5
6
5.5
0
20
40
60
80
100
E_{kin}[GeV]

Energy response



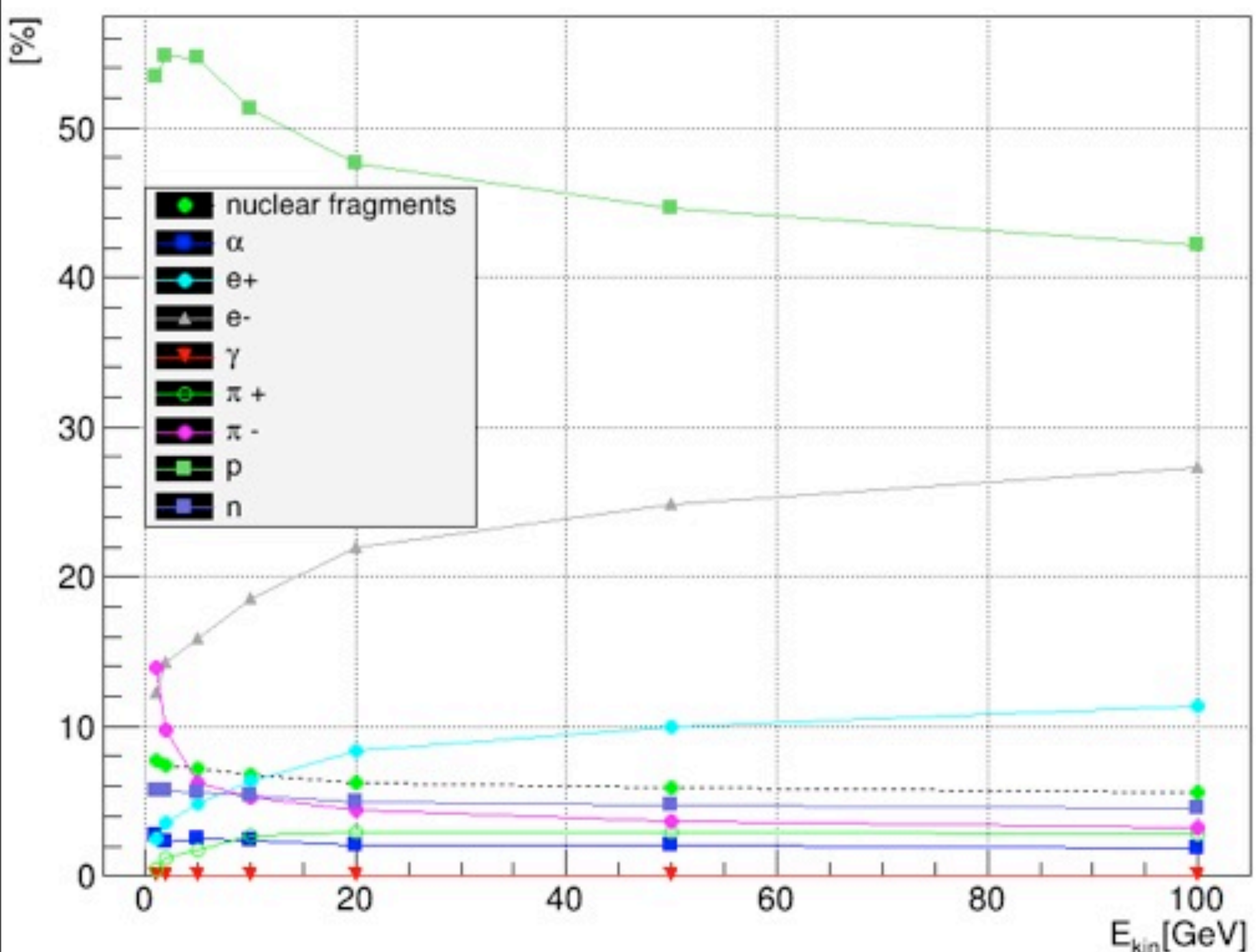


Contribution to E_{dep} by particle (Average deposited energy/event) in Pb
[%]
50
40
30
20
10
0
0
20
40
60
80
100
E_{kin}[GeV]
nuclear fragments
α
e+
e-
γ
π +
π -
p
n

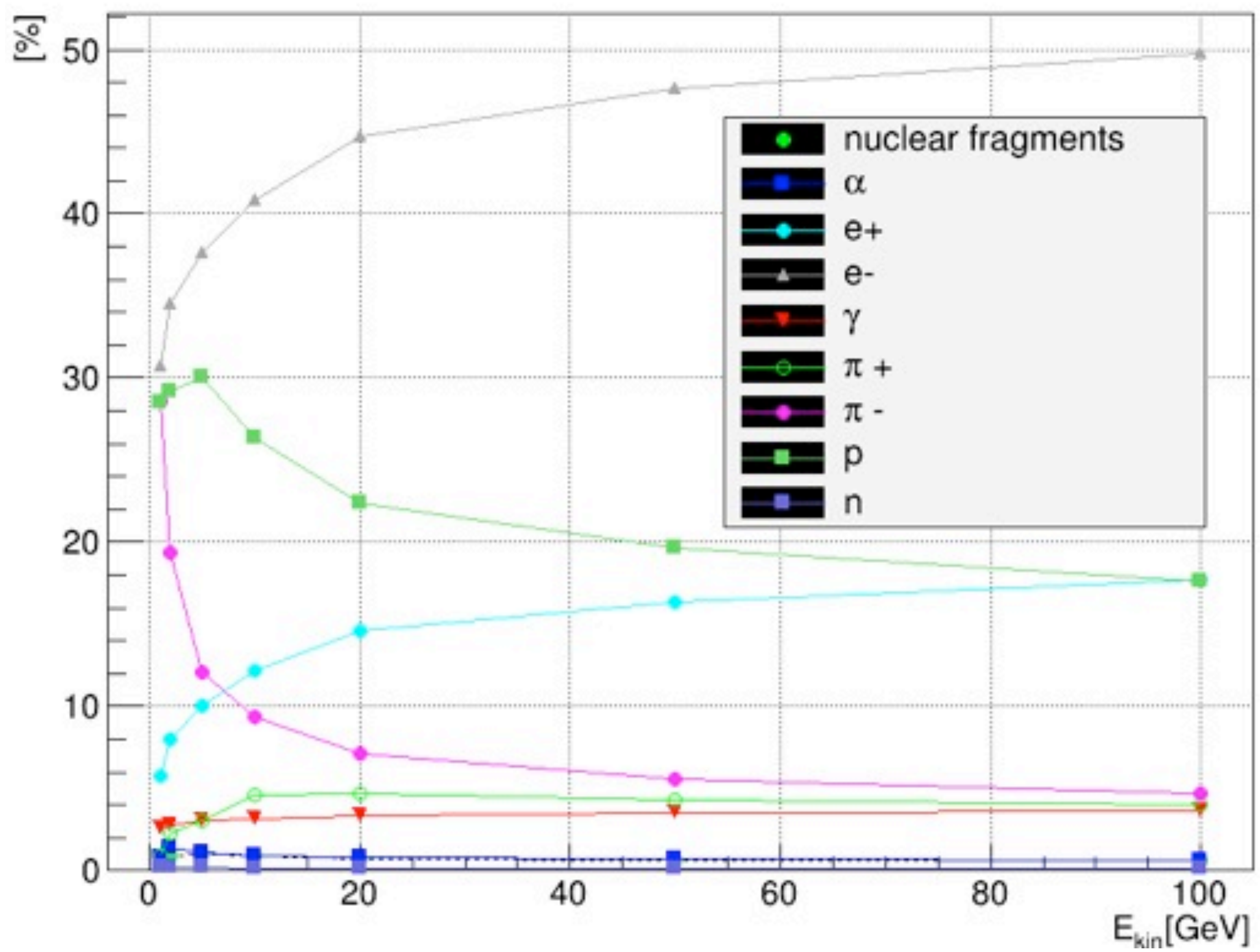


Contribution to E dep by particle (Average deposited energy/event) in scintillator
[%]
nuclear fragments
α
e+
e-
γ
π +
π -
p
n
0
10
20
30
40
50
0
20
40
60
80
100
Ekin[GeV]

Contribution to E dep by particle (Average deposited energy/event) in scintillator



Contribution to E_{dep} by particle (Average deposited energy/event) in Pb



What is next?

- We are now able to have a detailed look at the particle and processes involved in energy deposition.

- We can repeat this study for several incident particles.