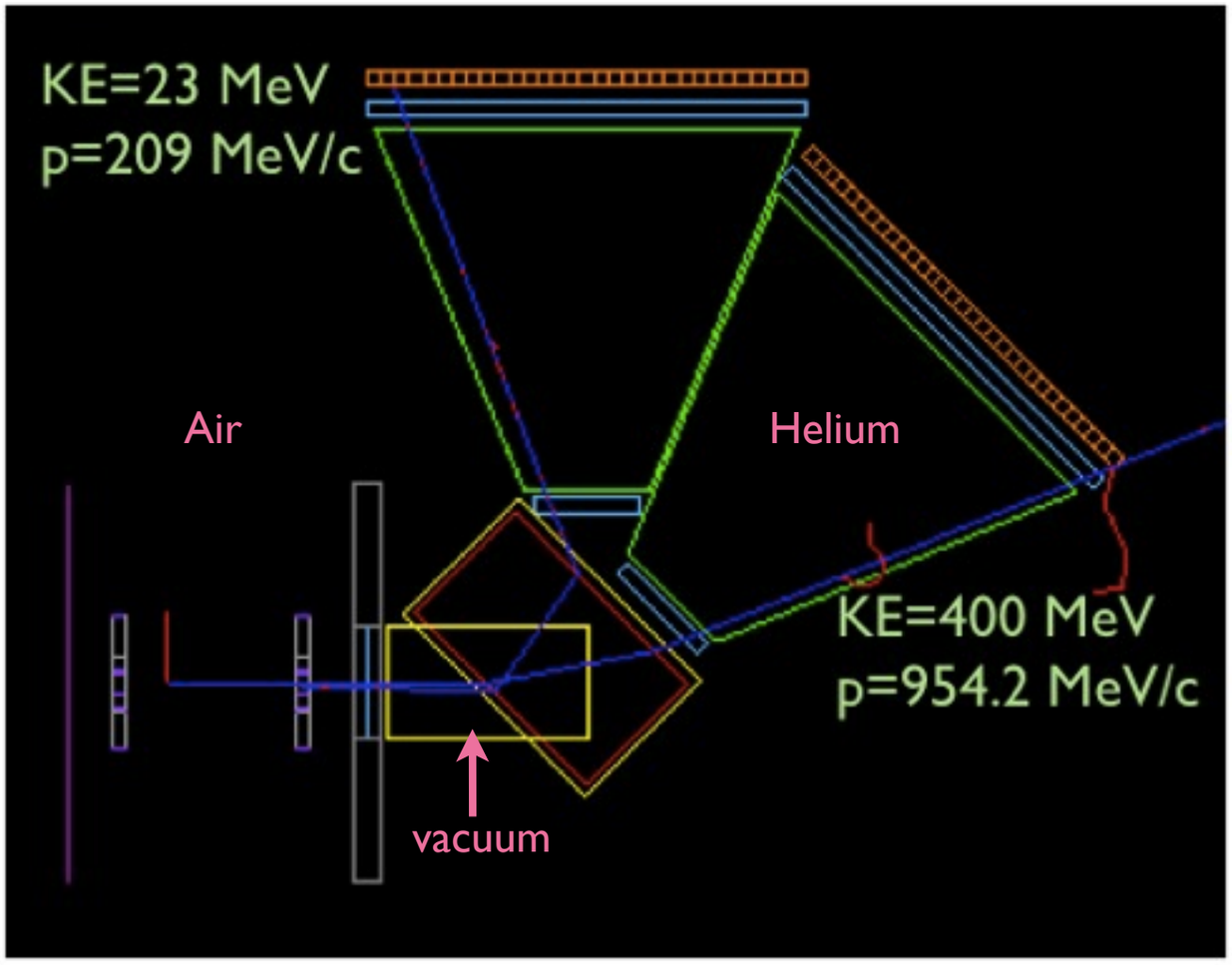
# 20121130

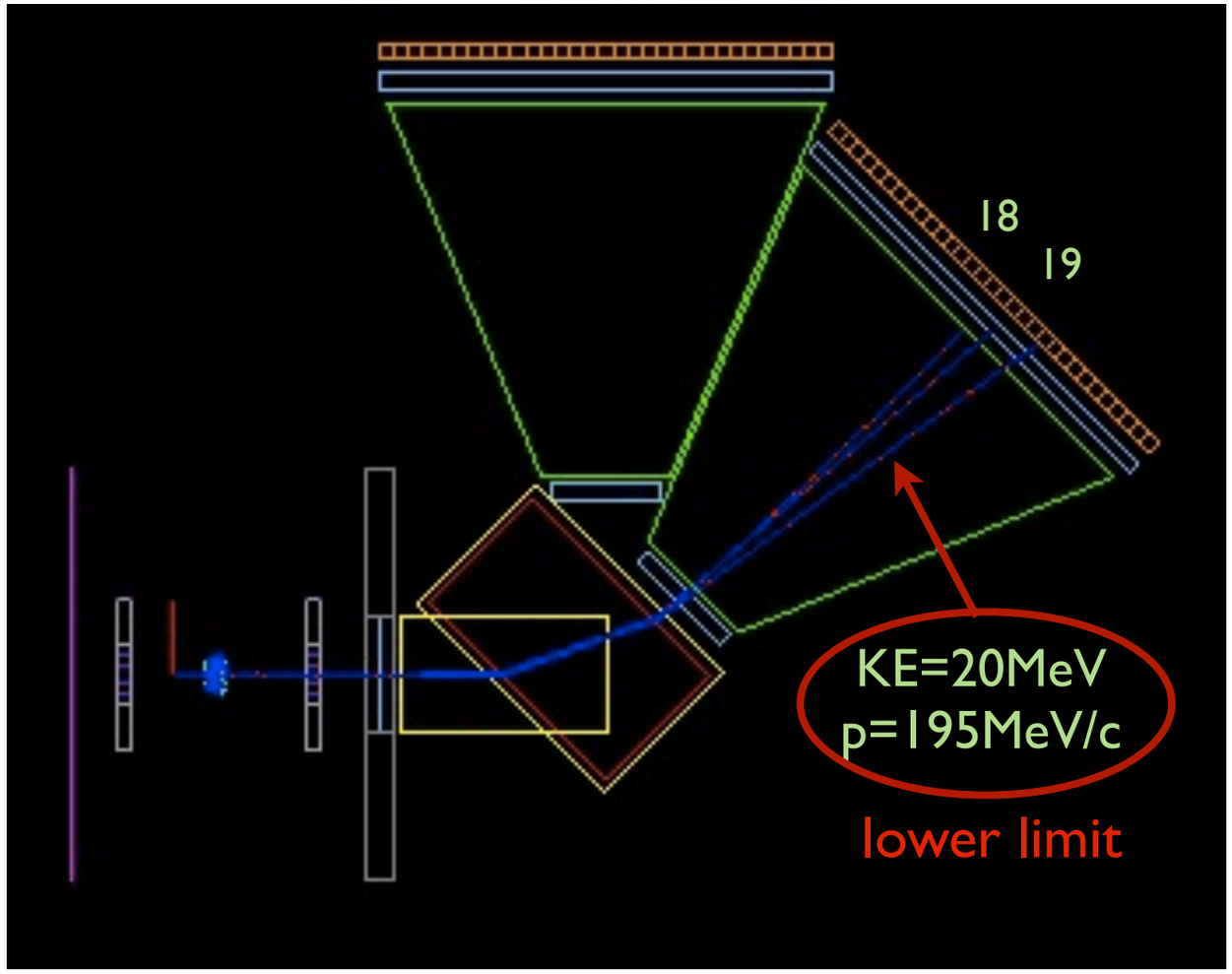
# KYO

- lower limit determination (Geant4)
- focal plane improvement for QD system (k-trace)
: shim angle for entrance surface also
: round-shaped exit surface

# [ Determination of lower limit ]




**B = 1.0 T**
(current design)

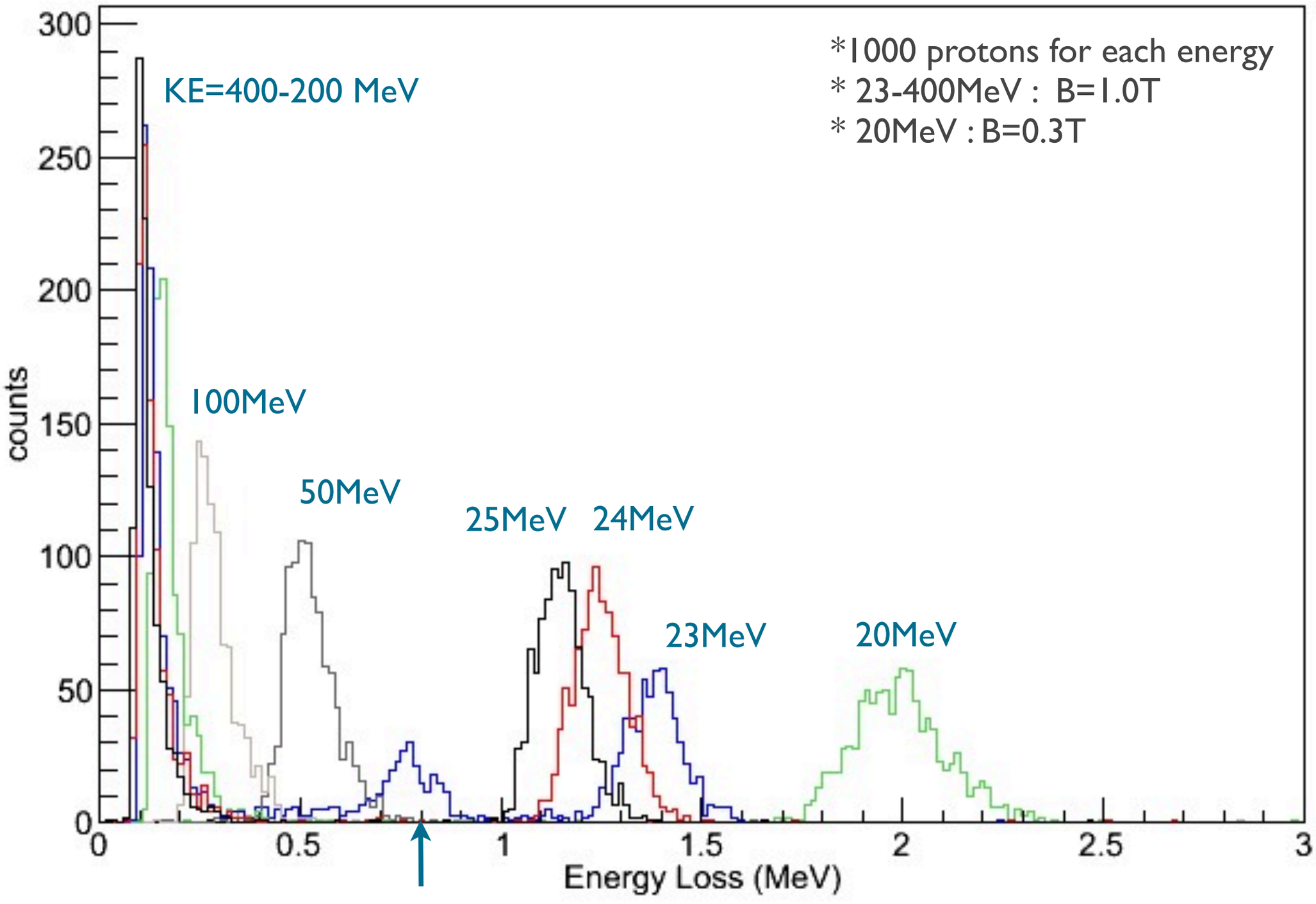



**B = 0.3 T**
(only for lower limit determination)

# [ Energy loss histograms 1 ]

1) Accumulate all the energy deposit before TOF.

=> Problem : Drift chambers are the only sensitive detectors.
(Helium bags and Air not included)

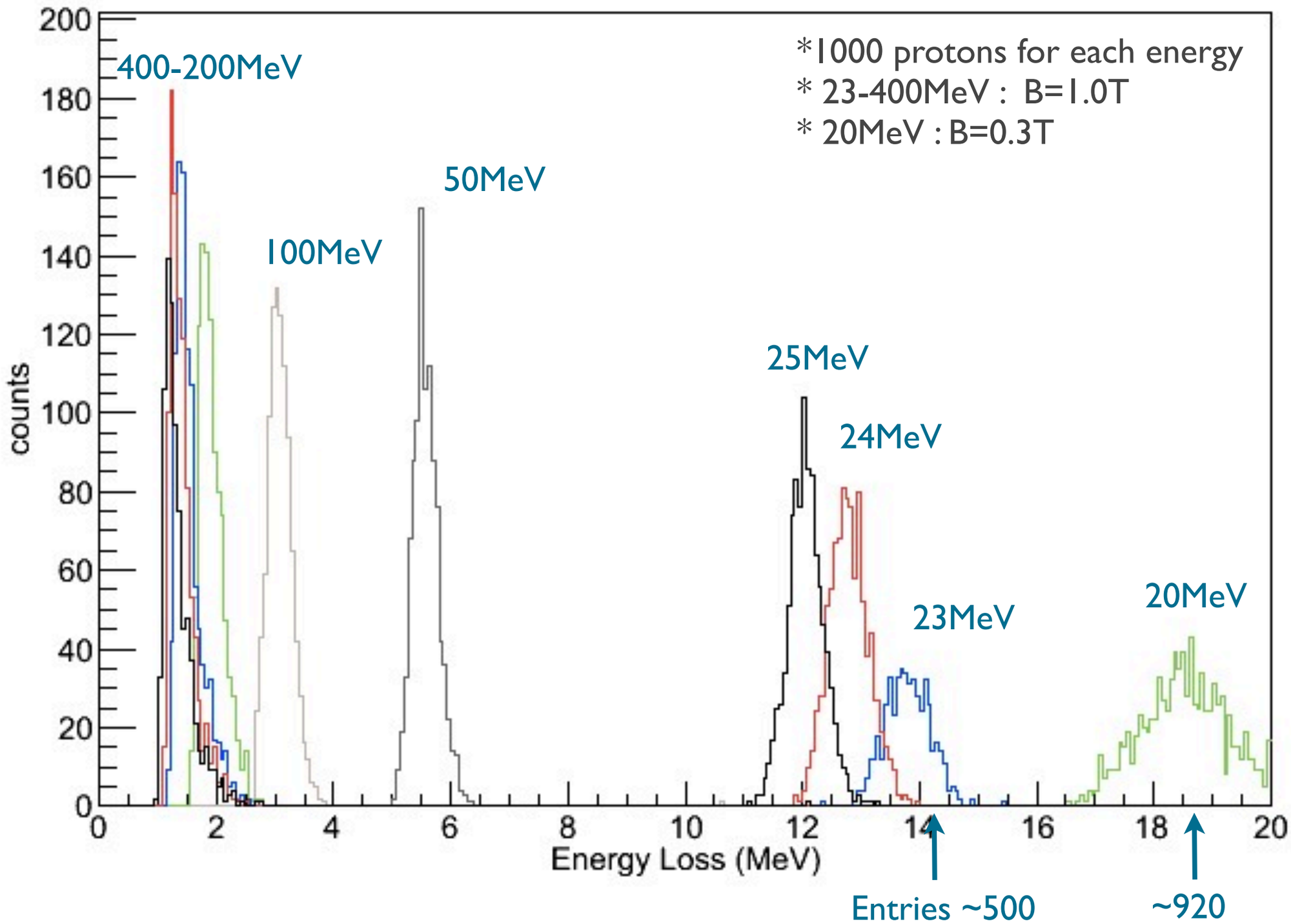



Stop before reaching TOF

# [ Energy loss histograms 2 ]

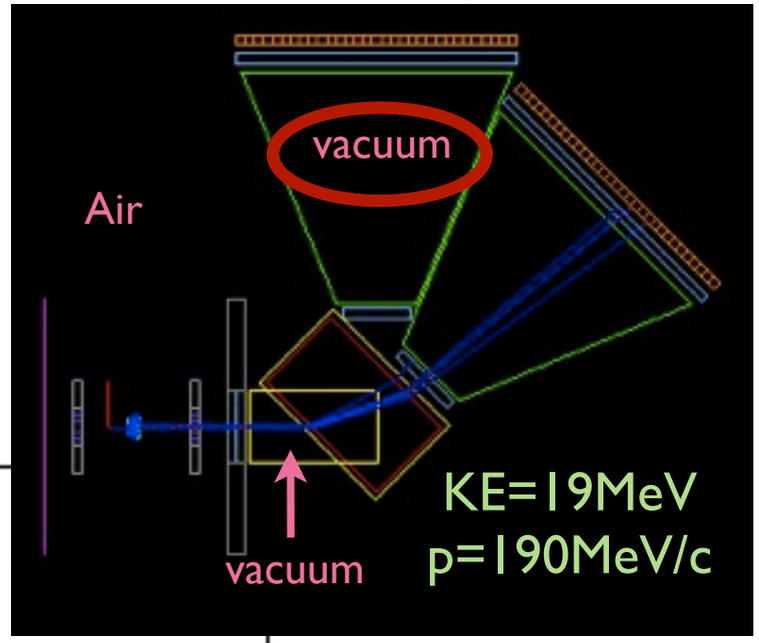
2) Using the momentum of 1st hit at TOF,
reconstruct the kinetic energy KE.

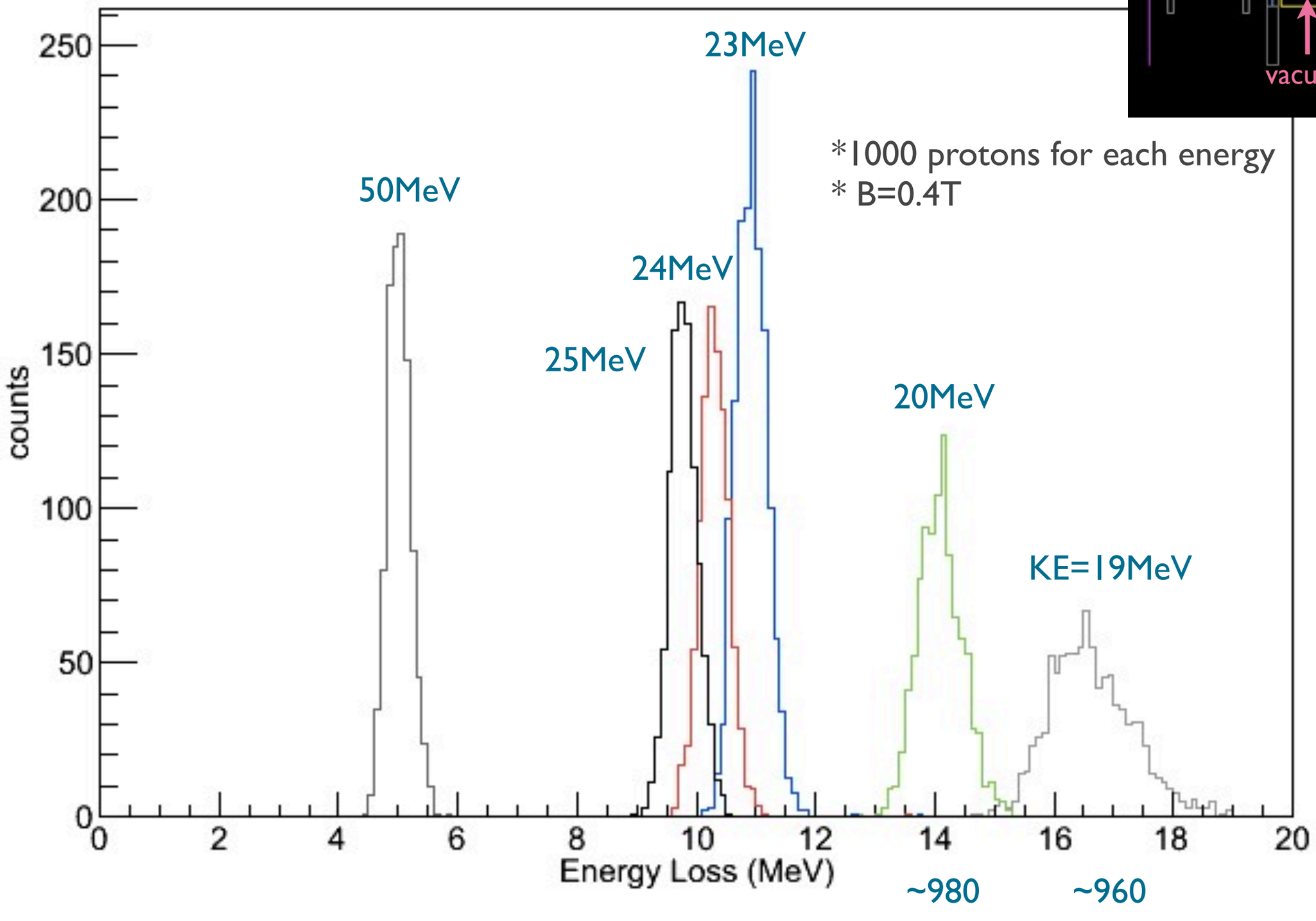
$$E_{tot} = KE + mc^2 = \sqrt{(pc)^2 + (mc^2)^2}$$



# [ Energy loss histograms 3 ]

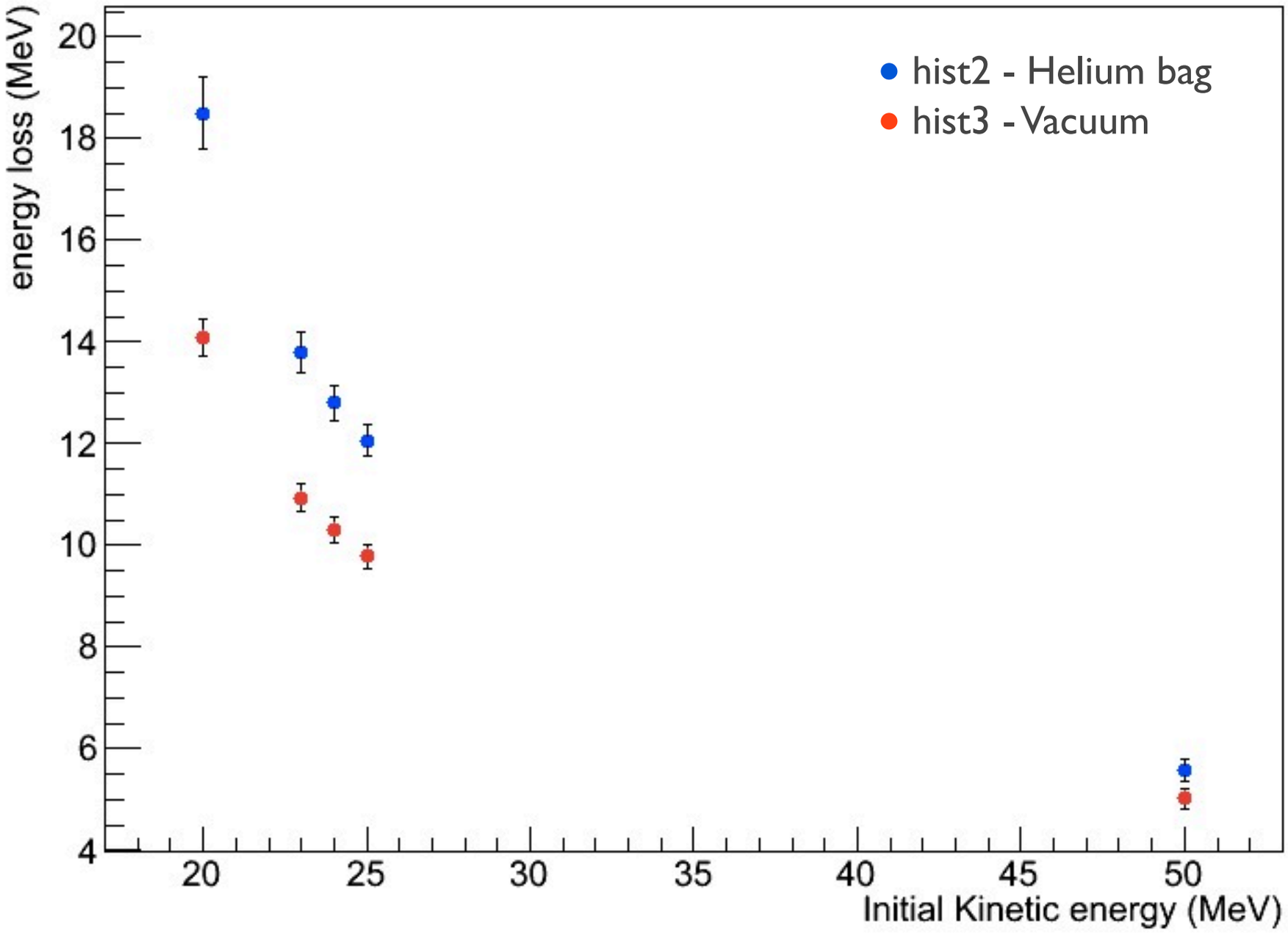
3) same method with 2),
   but change Helium bag to Vacuum.




*1000 protons for each energy
* B=0.4T

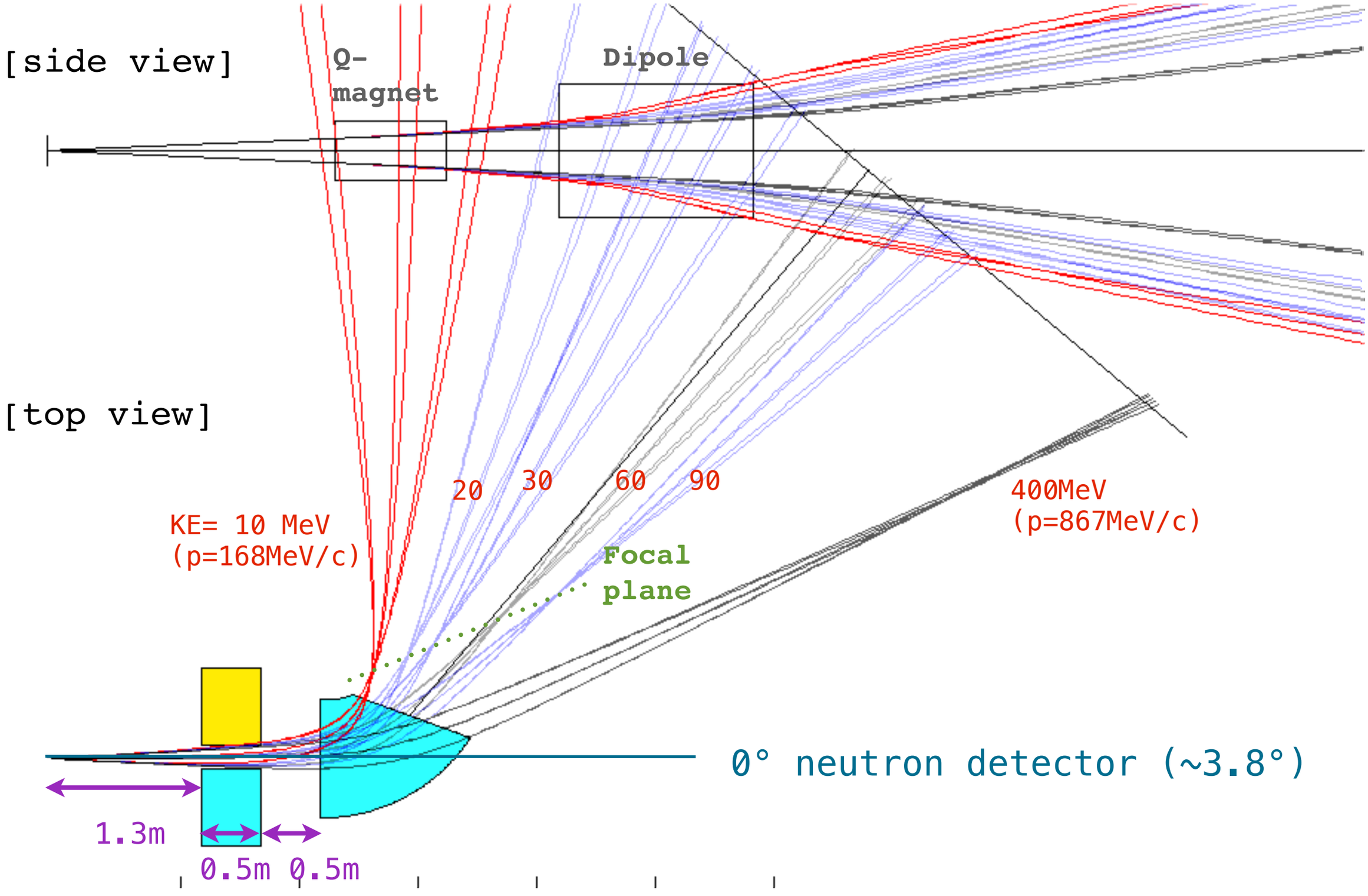
# [ Energy loss histograms ]



# [ QD-system ]

: R=1.0m,  B_DP = 1.1T,  β=20°,  θ=50°  B_Q = 0.5T/m (x-focusing)

: energy range of proton : 10 - 400 MeV



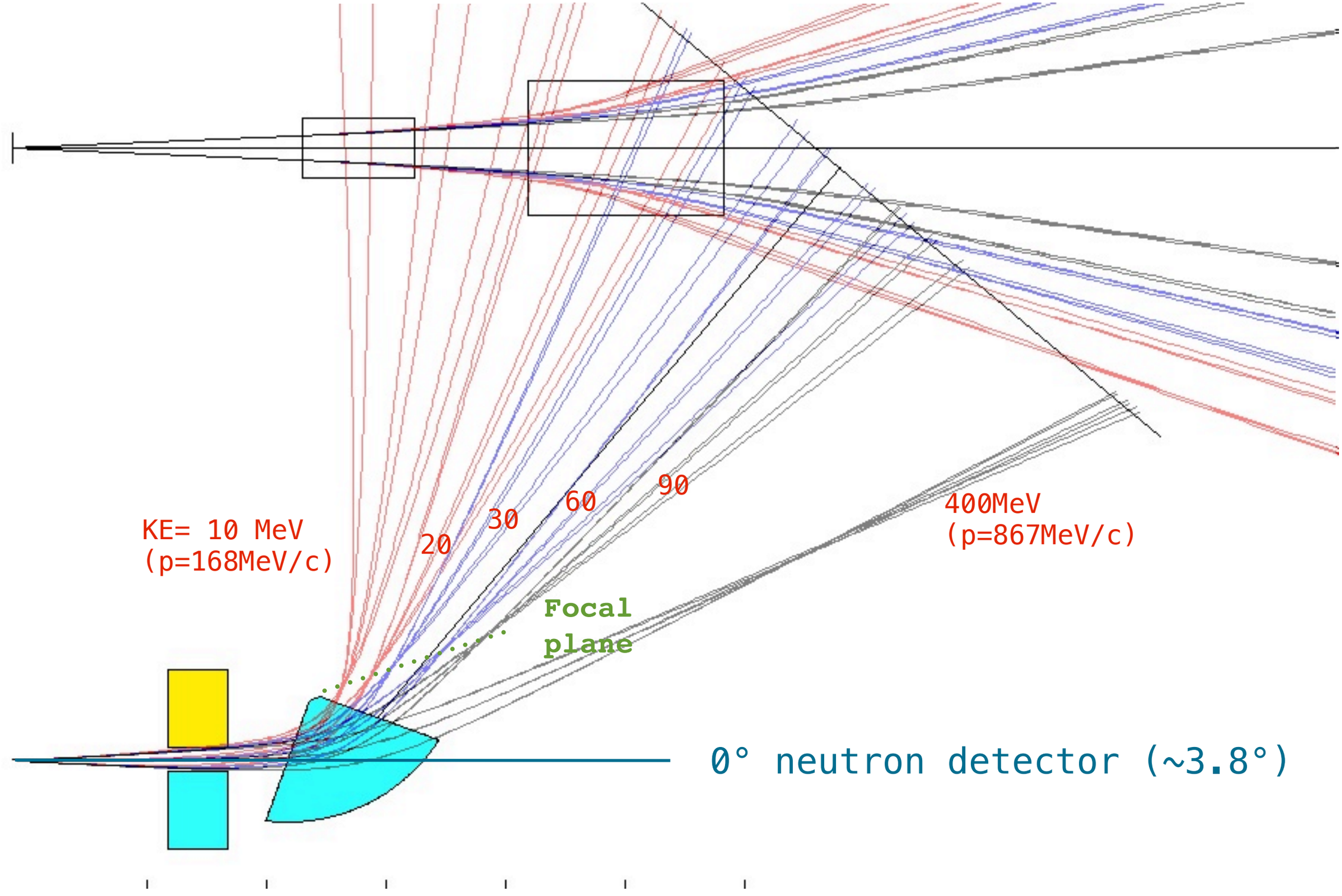
# [ 1. shim angle for entrance surface]

: R=1.0m,  B_DP = 1.1T, θ=50°

: entrance β = -20°, exit β = 20°

: energy range of proton : 10 - 400 MeV

B_Q = 0.5T/m (x-focusing)

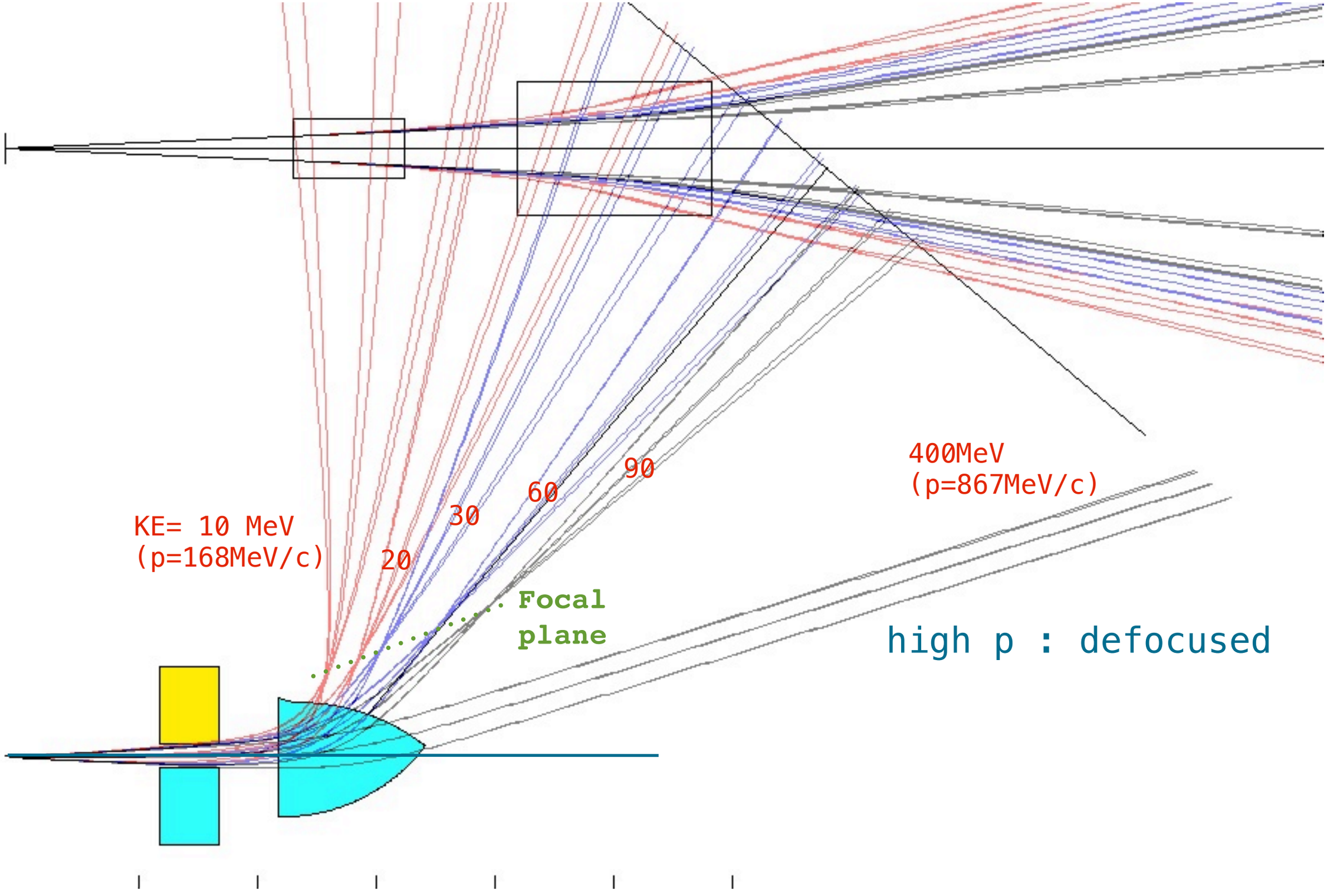


# [ 2. round-shaped exit surface ]

: R=1.0m,  B_DP = 1.1T,  β=20°,  θ=50°  B_Q = 0.5T/m (x-focusing)

: exit surface y = 0.3x^2

: energy range of proton : 10 - 400 MeV



## [ Future plans ]

- determine lower limit : ~20MeV?

- upper limit : ~350MeV?  $E_{\mathrm{F}} = \frac{p_{\mathrm{F}}^2}{2m_{\mathrm{N}}} \approx 33\ \mathrm{MeV}$

- solenoid affects low p particles.

- QQD system simulation
  : check beam aperture. (윤종철박사님)
  : 2nd Q-magnet acceptance
   (larger aperture radius ~20cm, elliptical shape ..)

- more precise simulation using other programs.
   (GICOSY, Geant4 ...)