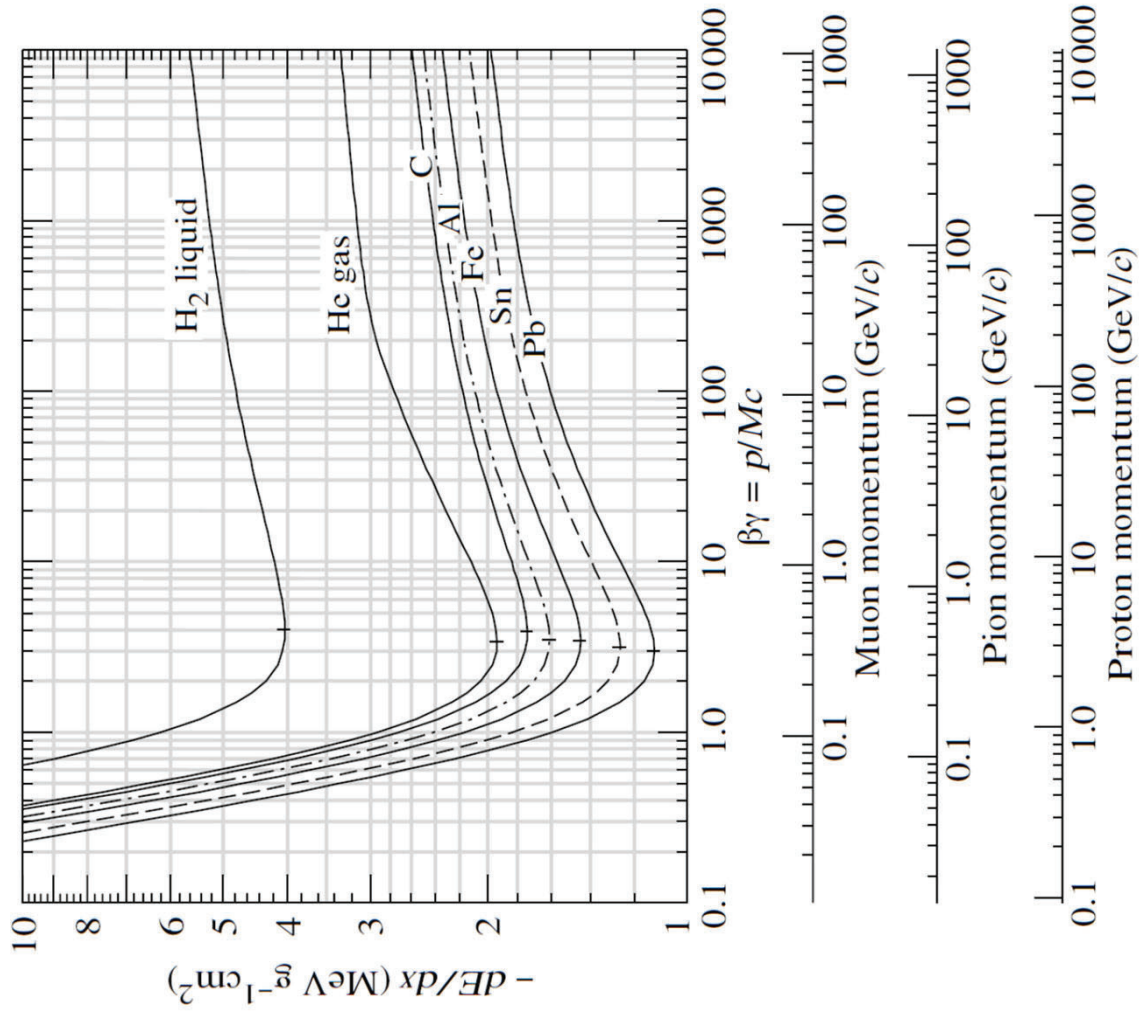
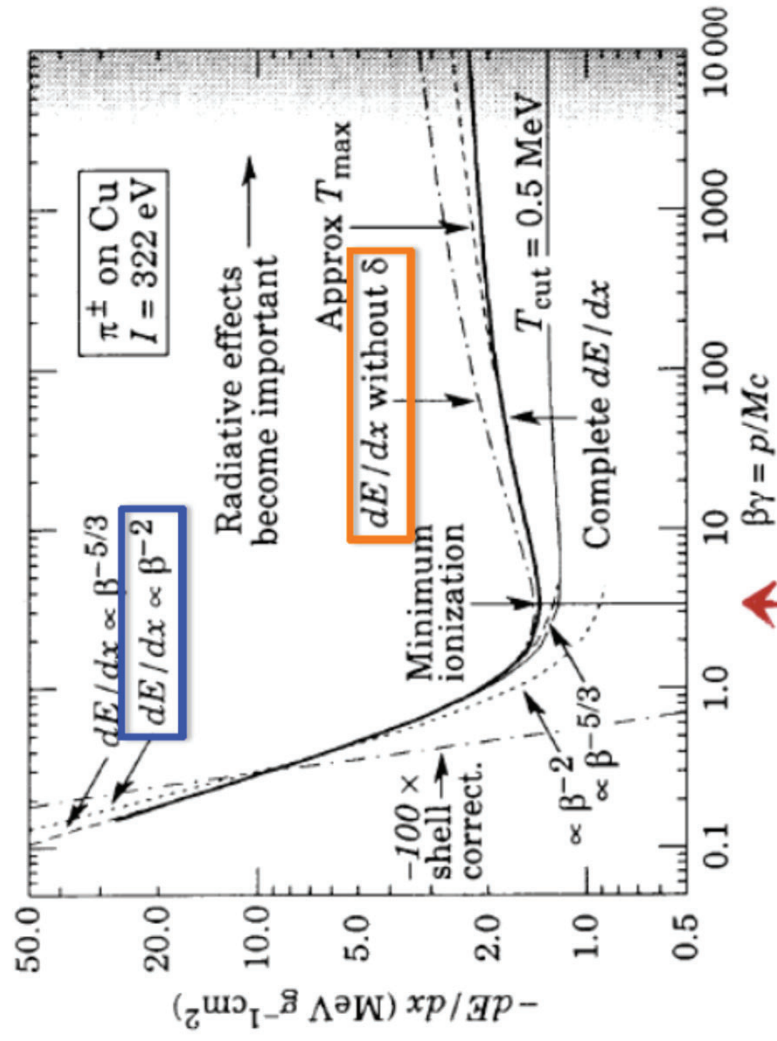


$$-\frac{dE}{dx} = \rho K Z^2 \frac{Z}{A} \frac{1}{\beta^2} \left[\ln \frac{2mc^2 \beta^2 \gamma^2}{I} - \beta^2 - \frac{\delta(\gamma)}{2} \right]$$

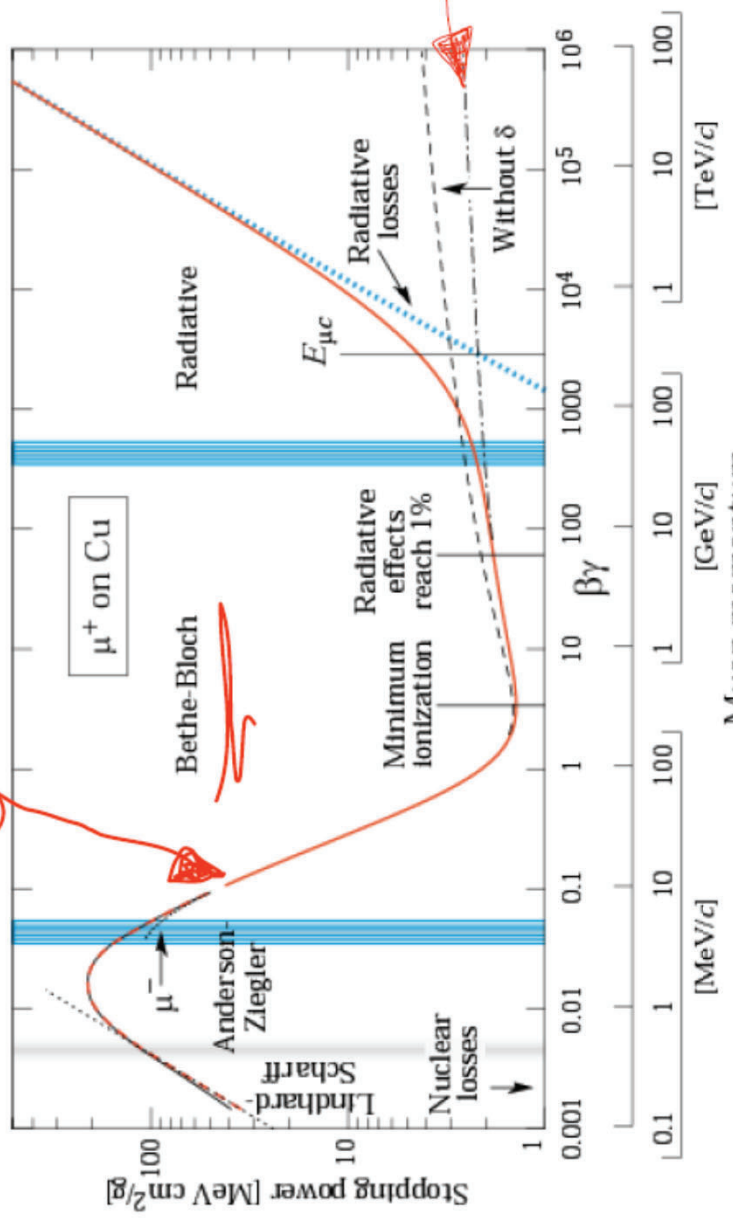




$$\frac{dE}{dx} \propto \frac{Z^2}{\beta^2} \ln(a\beta^2\gamma^2)$$

$$\beta\gamma = 3-4$$

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



Stopping power ($\equiv \langle dE/dx \rangle$) for positive muons in copper as a function of $\beta\gamma = p/Mc$ over nine orders of magnitude in momentum (12 orders of magnitude in kinetic energy). Solid curves indicate the total stopping power.

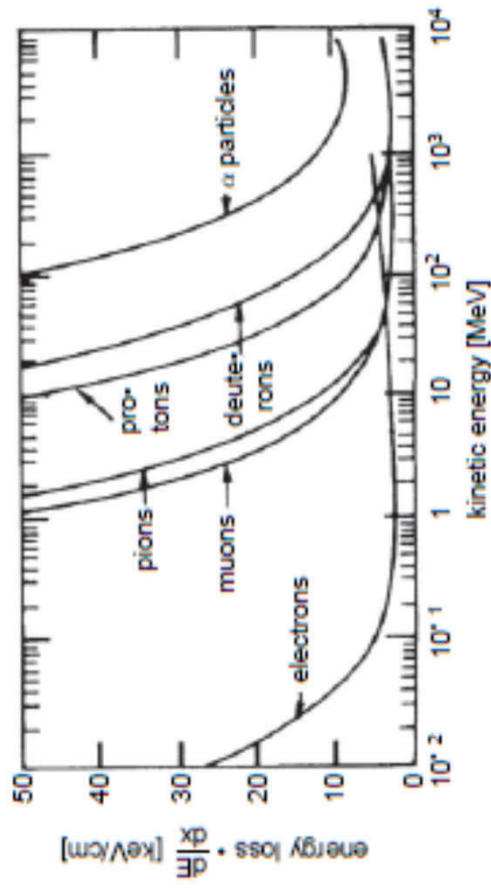
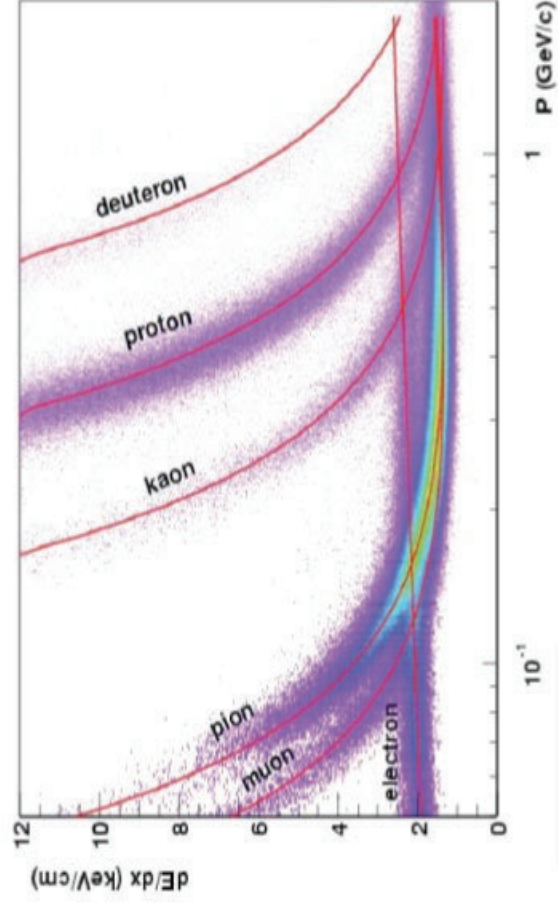
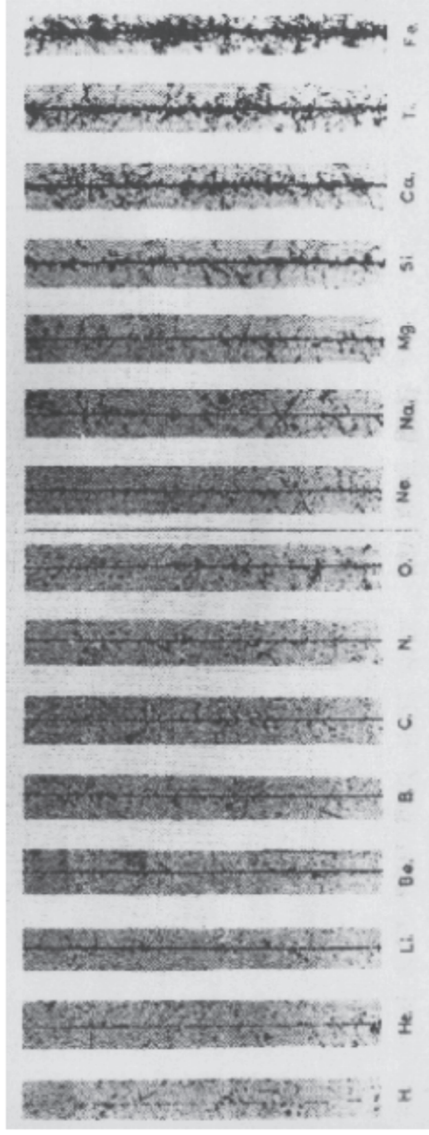


fig. 1.2. Energy loss for electrons, muons, pions, protons, deuterons and α particles in air [14].

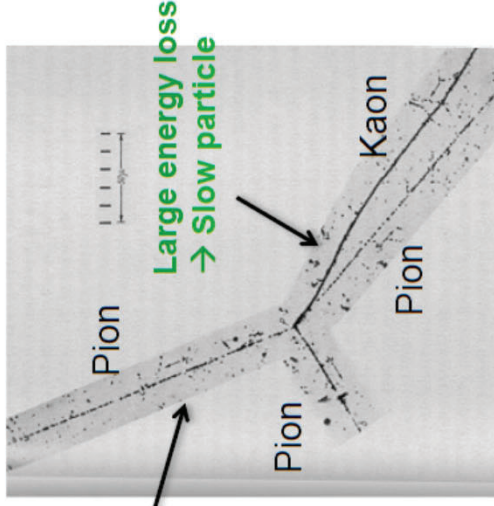
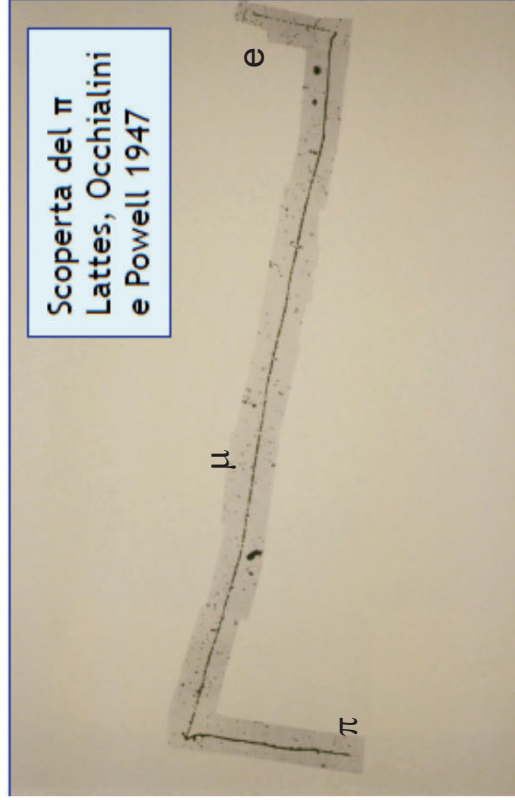
- **STAR Time-Projection Chamber (TPC):**

10% Methan / 90% Argon (2mbar above athm. pressure)





emulsioni



Anderson's cloud chamber picture of cosmic radiation from 1932

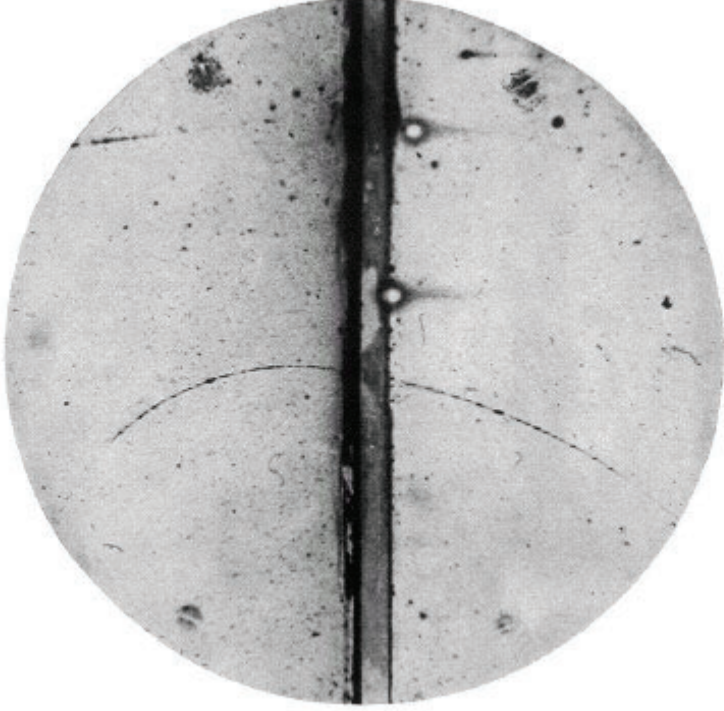


FIG. 1. A 63 million volt positron ($H_0 = 2.1 \times 10^6$ gauss-cm) passing through a 6 mm level plate and emerging as a 23 million volt positron ($H_0 = 7.5 \times 10^6$ gauss-cm). The length of this latter path is at least ten times greater than the possible length of a proton path of this curvature.

Positron discovery

Charge (and momentum) from the curvature in magn. field (and direction with help of absorber...)

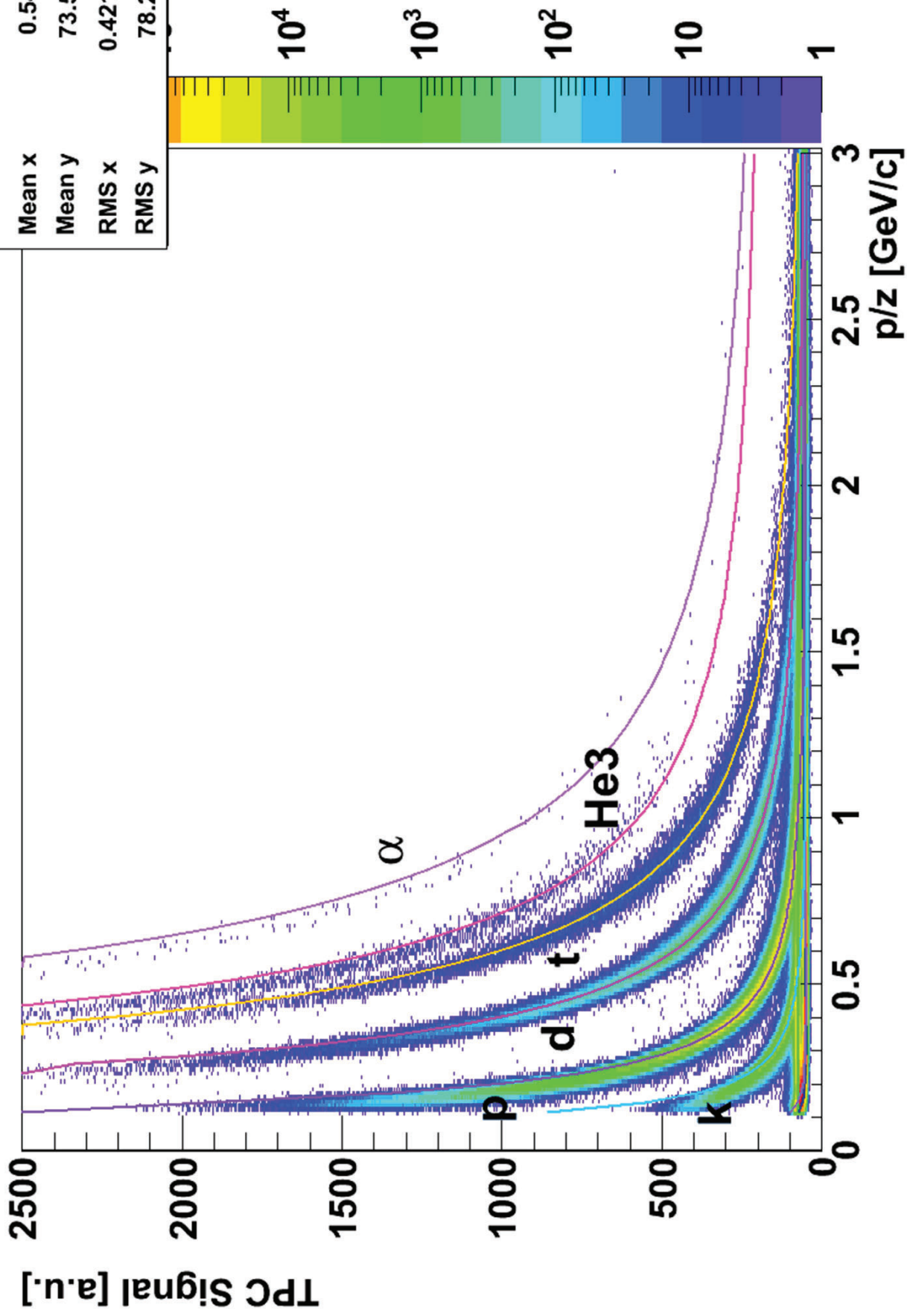
Mass from range vs. momentum

Measured quantities: track, i.e. position measurement (in several points along the trace)

Cloud chamber: sealed environment containing a supersaturated vapor of water or alcohol. When a charged particle interacts with the mixture, it ionizes it. The resulting ions act as condensation nuclei, around which a mist will form .

BetheBlochTPC

fhBB	
Entries	3.033383e+08
Mean x	0.541
Mean y	73.57
RMS x	0.4212
RMS y	78.27



fBetavsTPCsignalPos

fBetavsTPCsignalPos	
Entries	3.988012e+07
Mean x	0.9133
Mean y	58.71
RMS x	0.1547
RMS y	26.86

