PHY397K - NUCLEAR PHYSICS - 10

PHY397K - NUCLEAR PHYSICS
Spring 2015, Unique numbers: 57115
RLM 5.116, TTH 12:30 - 2:00 pm

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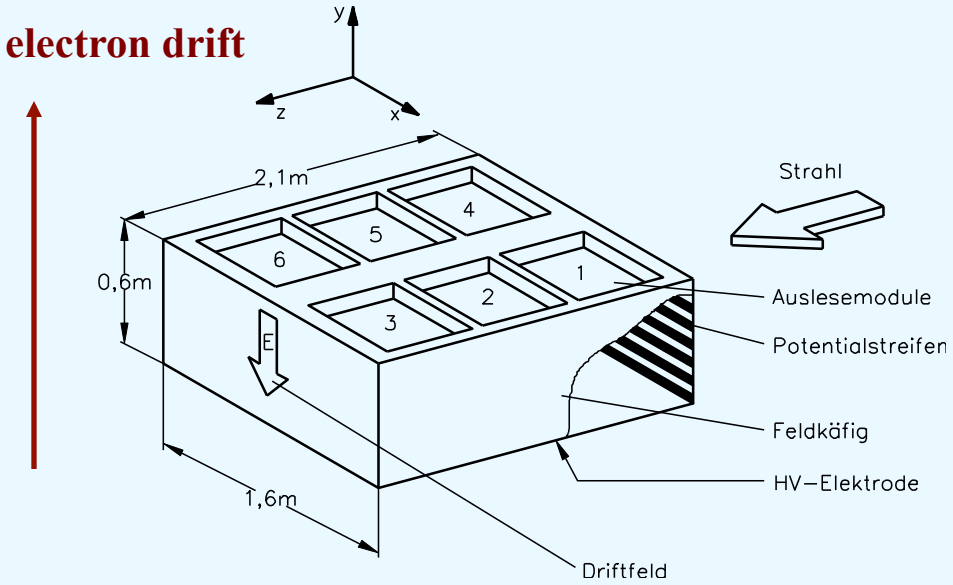
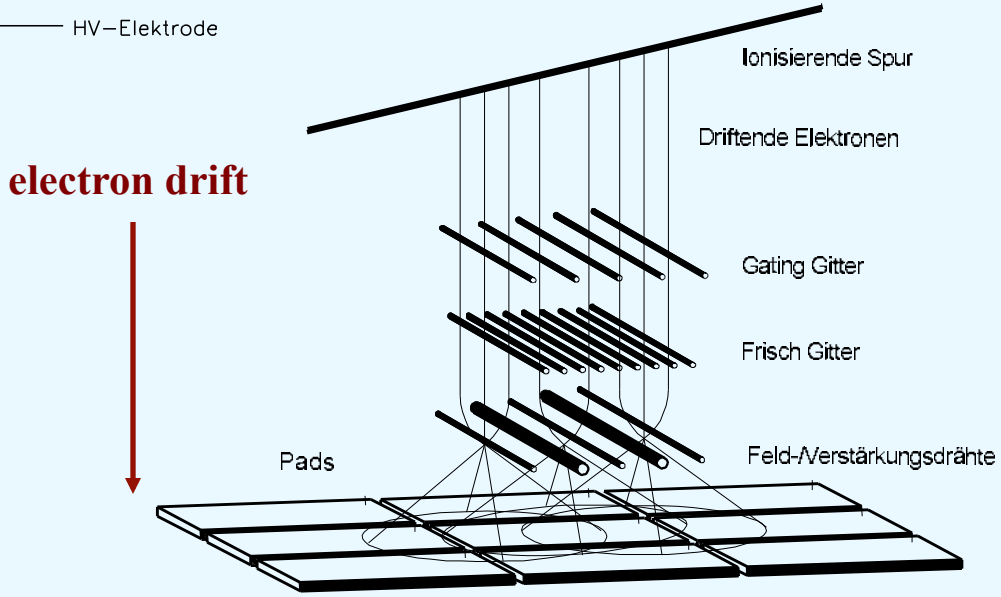
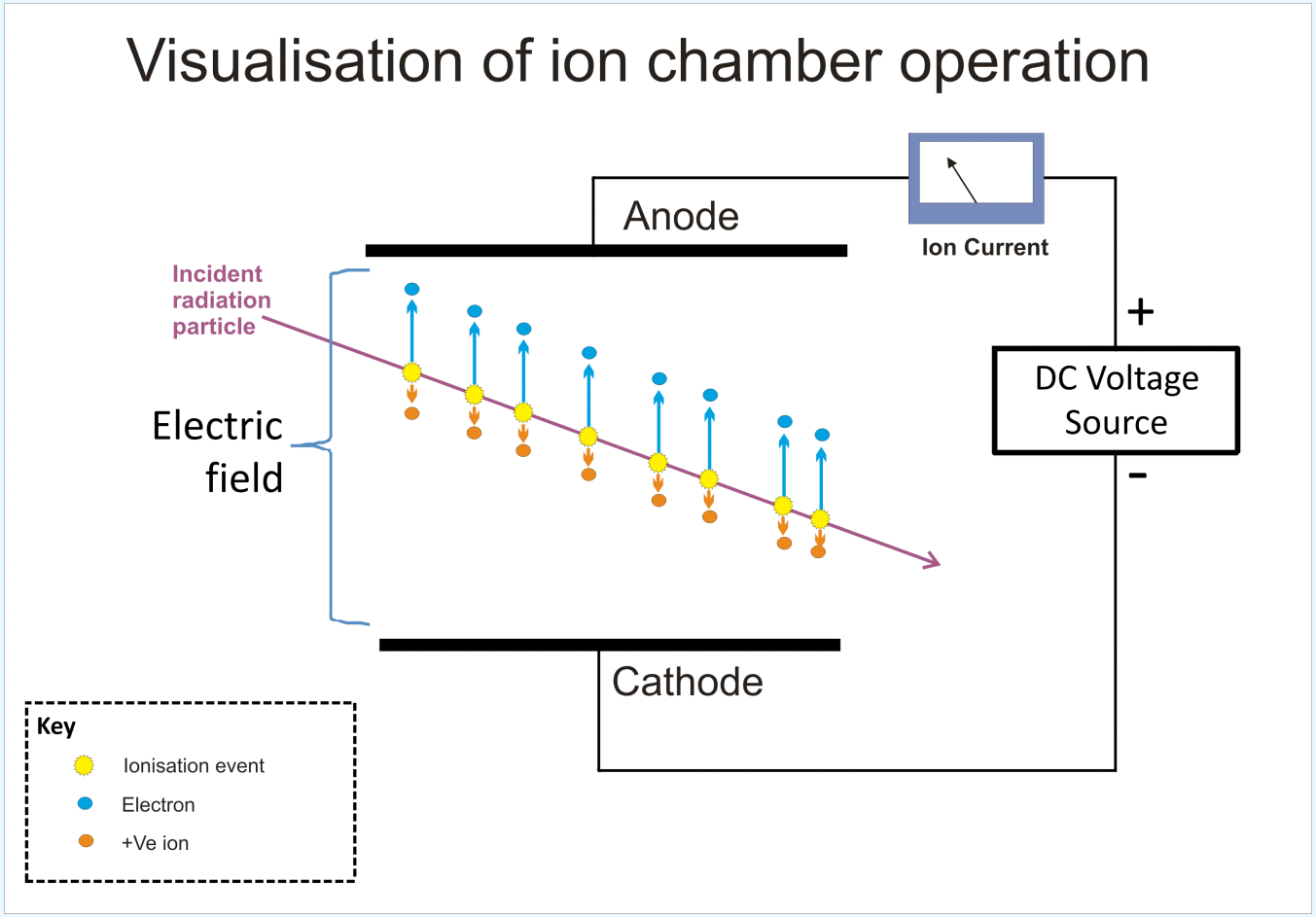
Email: cmarkert@physics.utexas.edu

NA49 Vertex TPC
(sorry this labels are in German on this plots !!!)

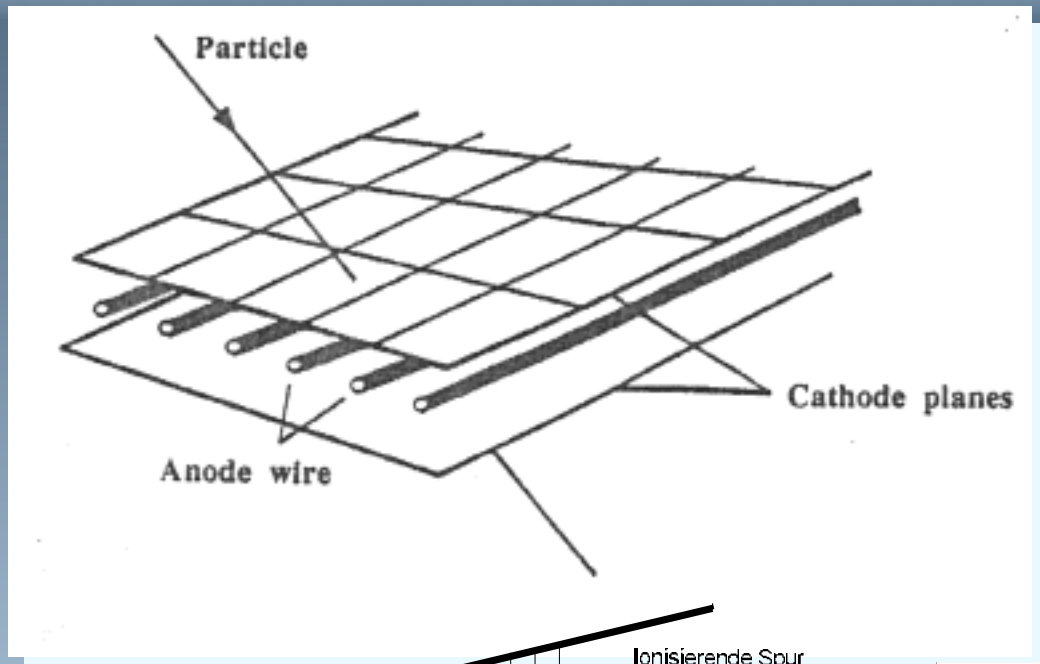




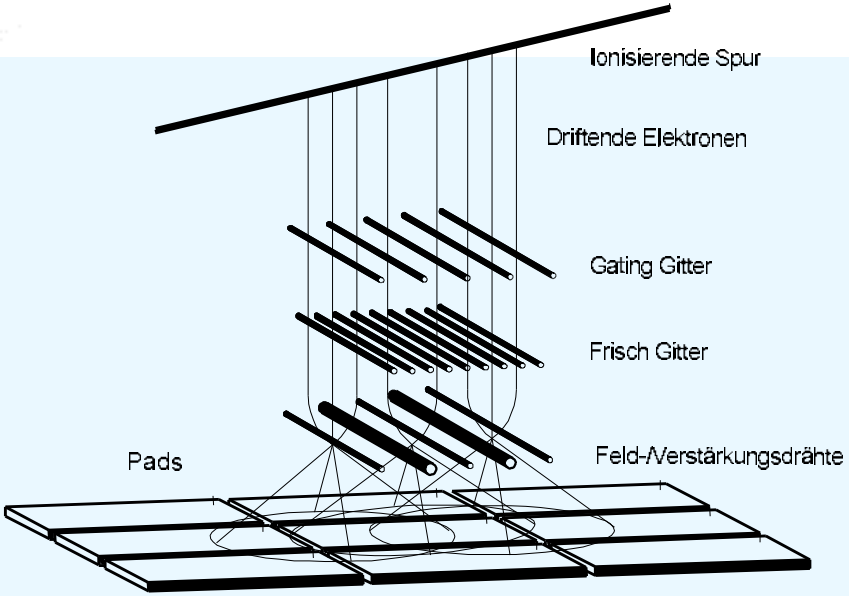
Ionization Detectors

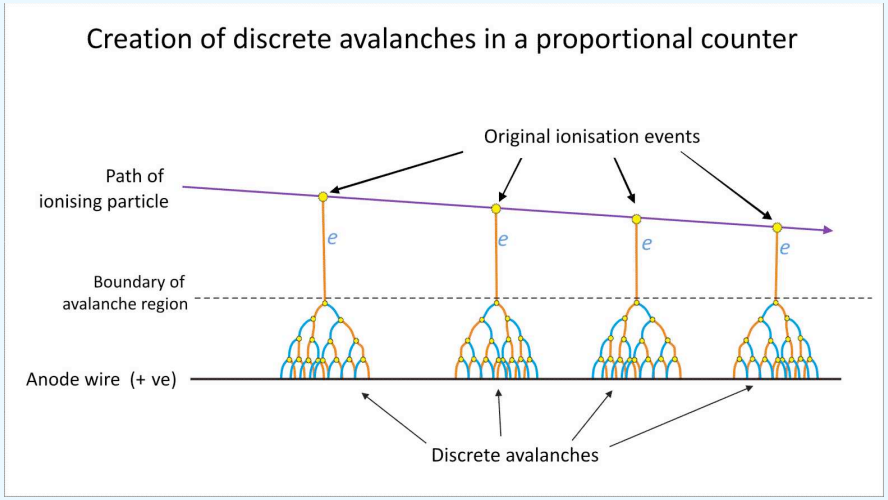


Proportional counter

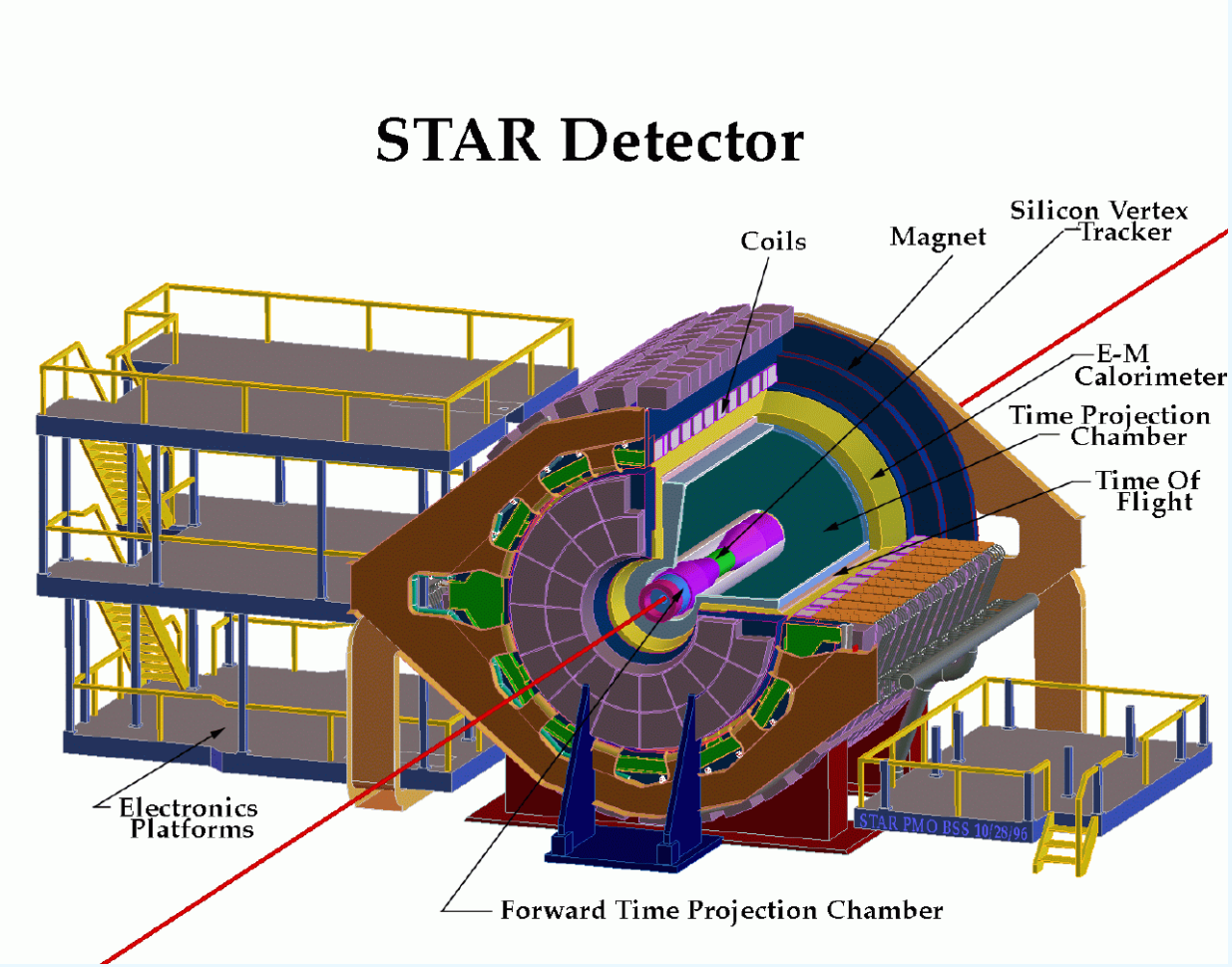


Signal is proportional to number of electrons from ionization





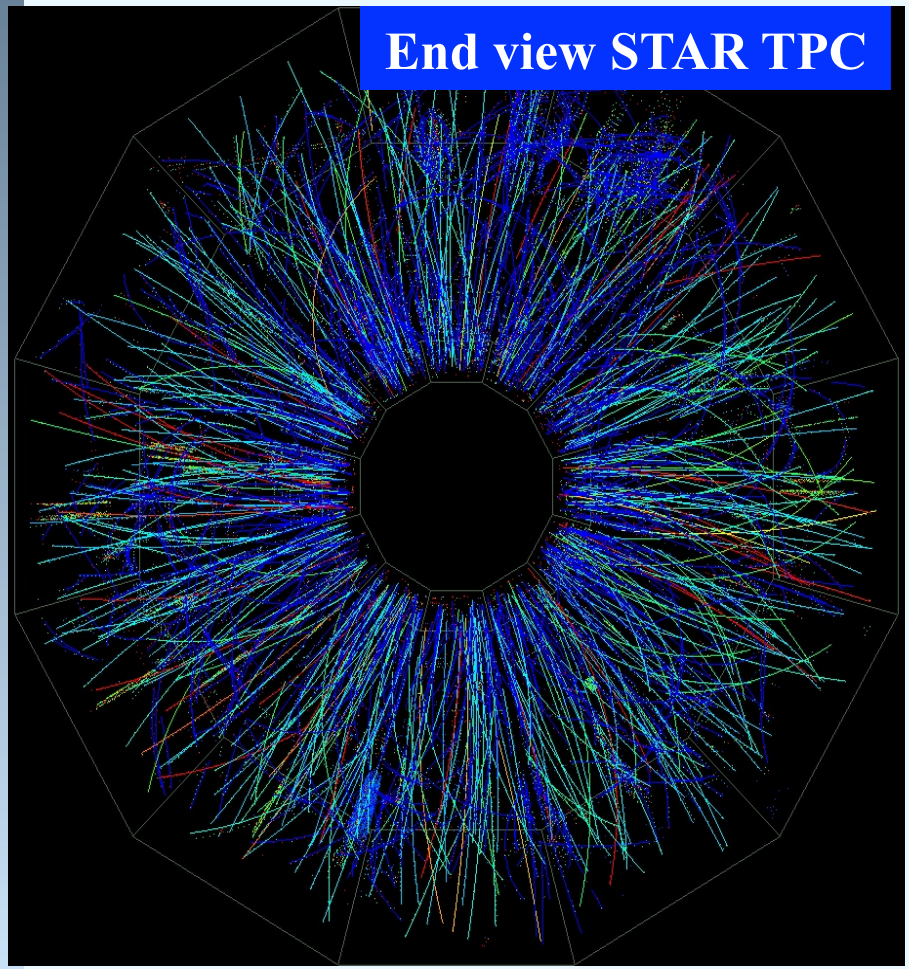
STAR Experiment



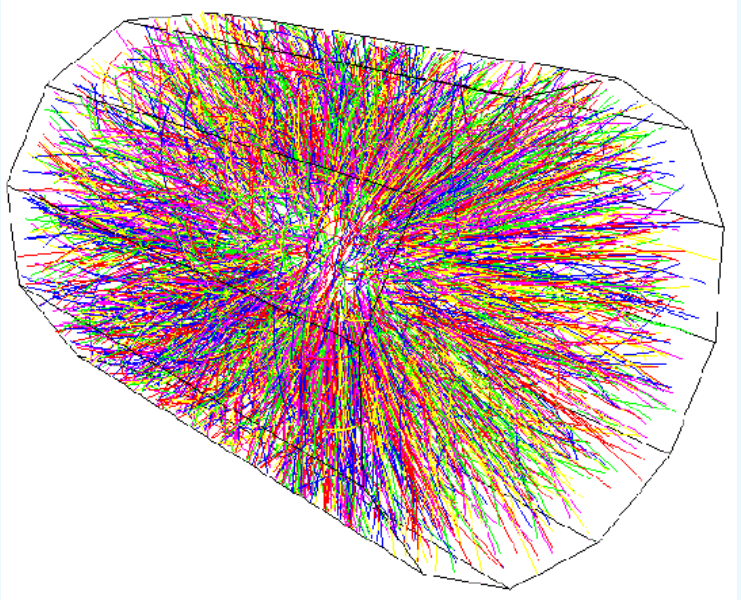
STAR TPC

Au+Au √s = 200 GeV

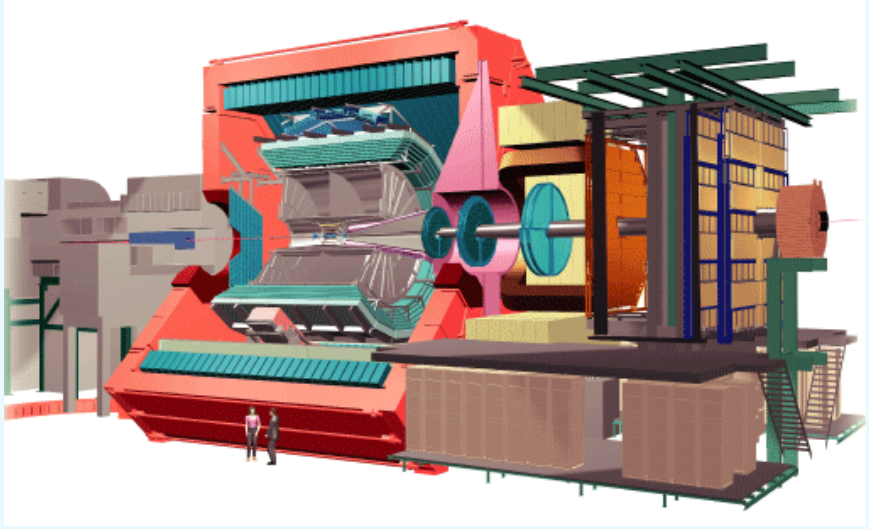
End view STAR TPC

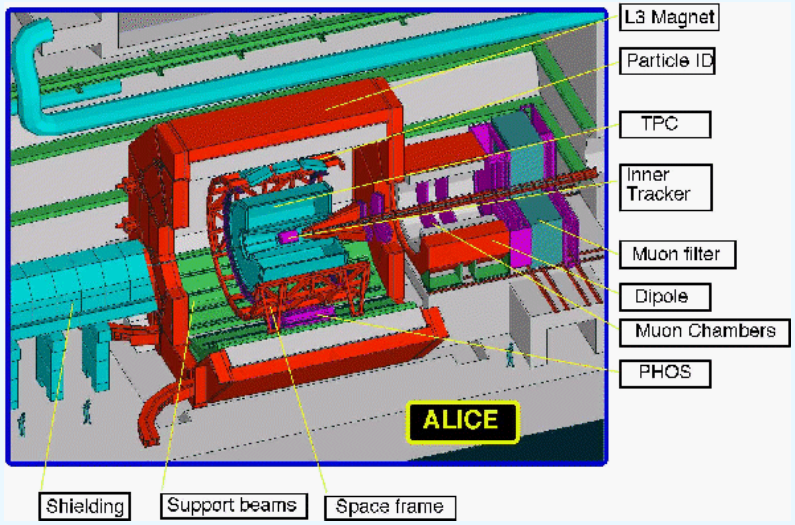


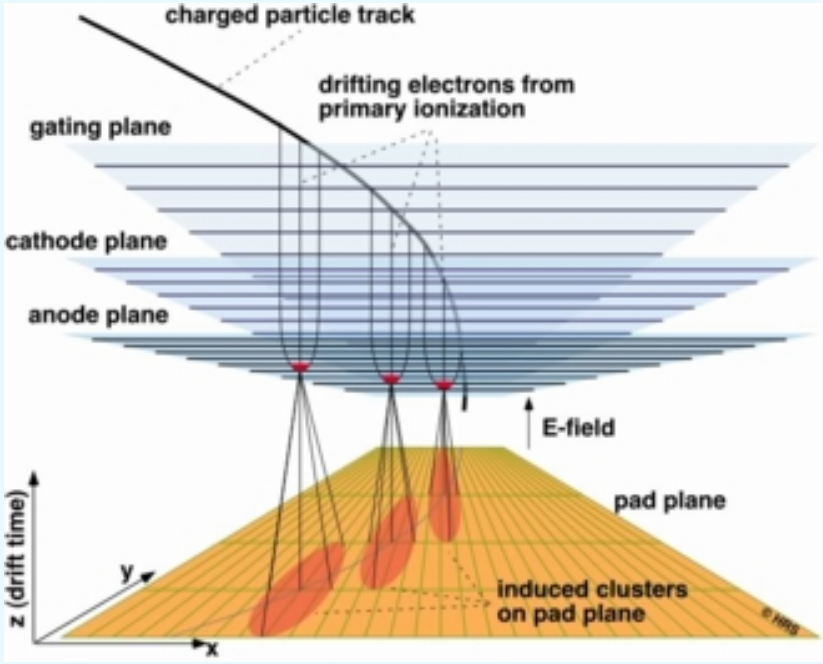
Side view STAR TPC



Alice Experiment and TPC



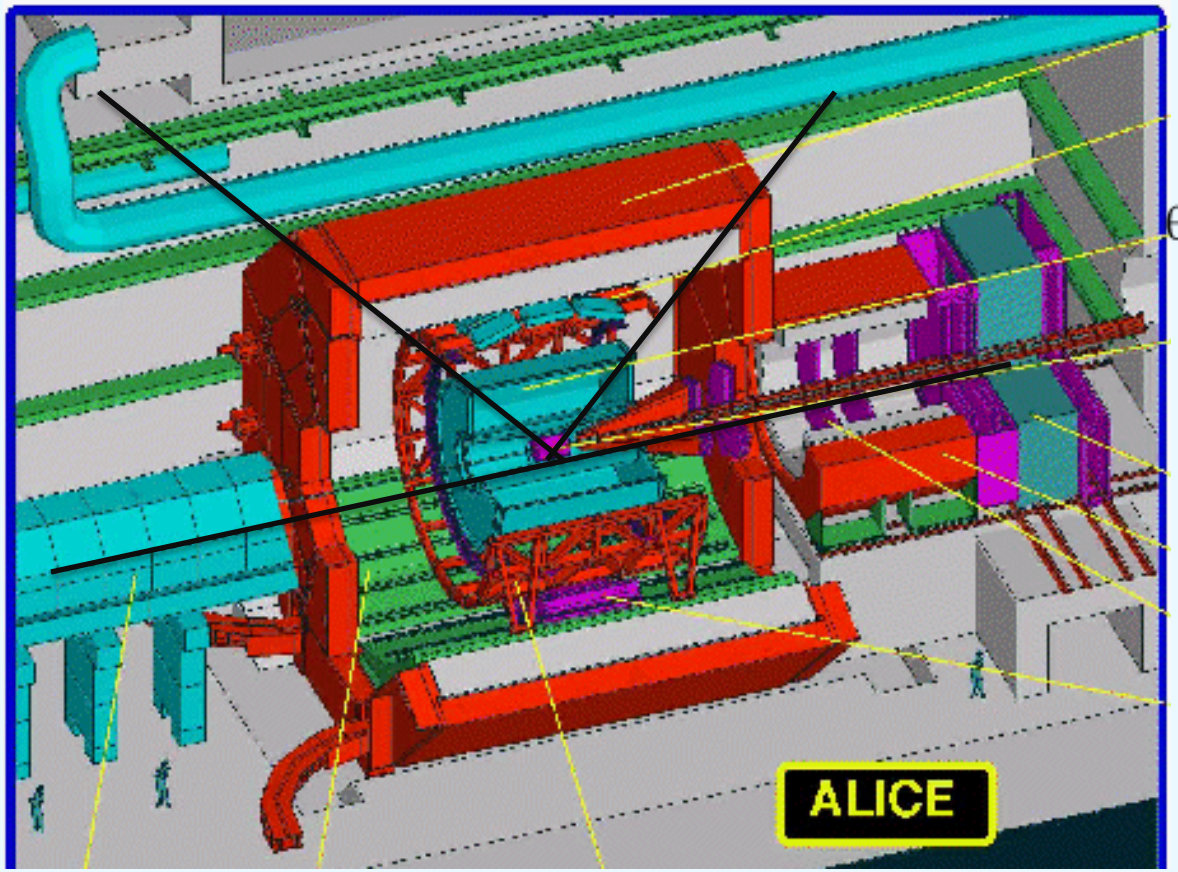


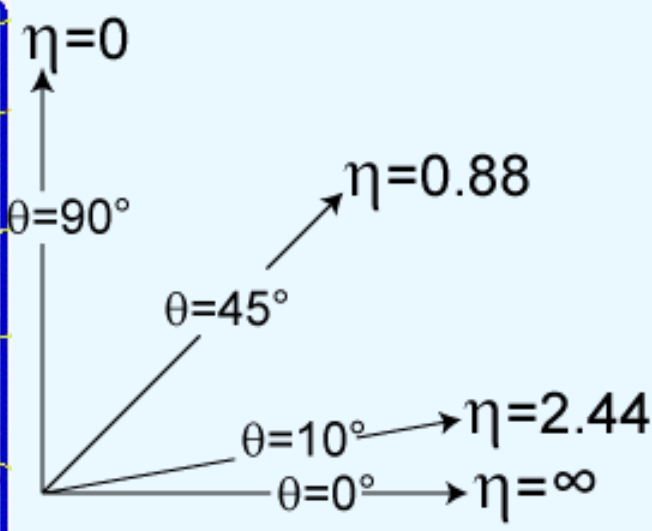


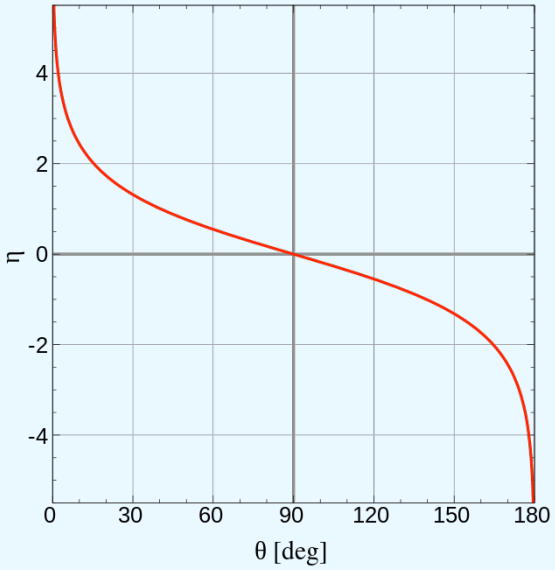
Alice Experiment and TPC

https://www.youtube.com/watch?feature=player_embedded&v=zEX5qKvFZSs

Alice Experiment and TPC







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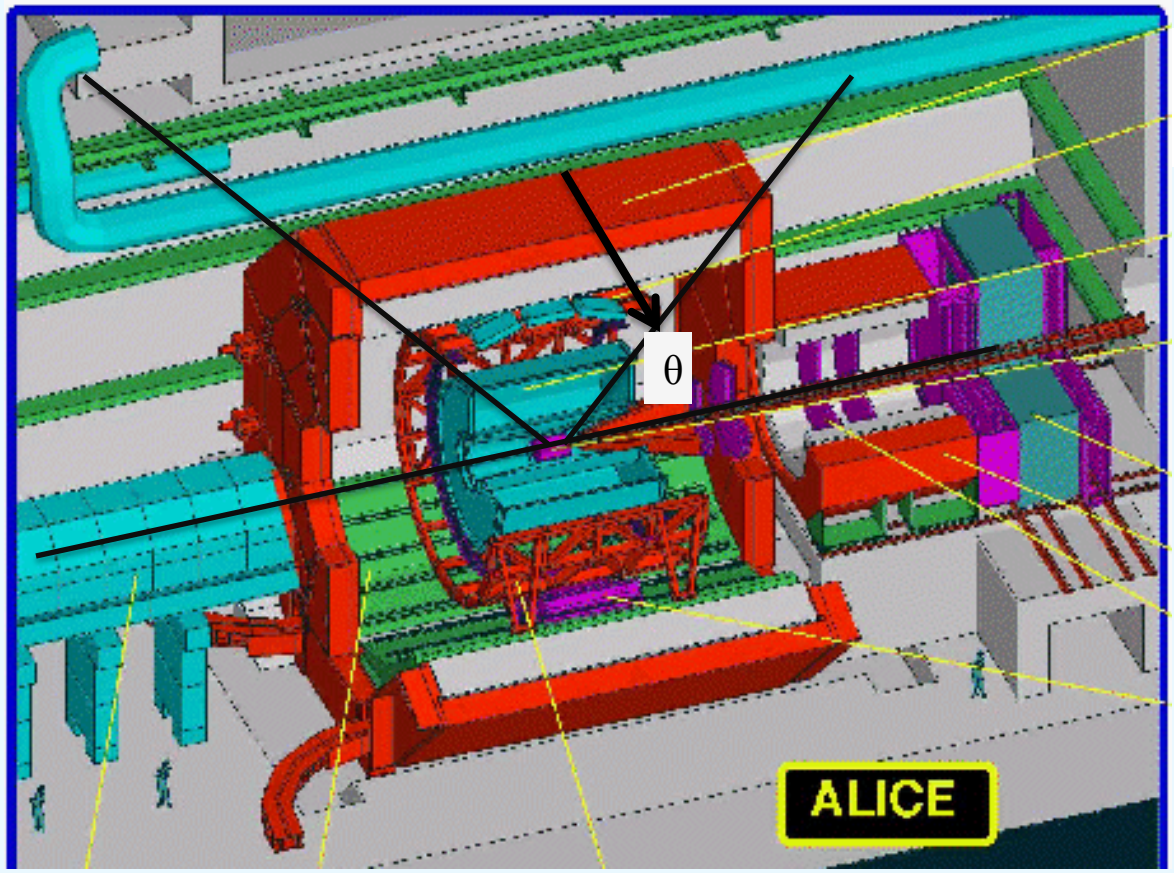


Rapidity

$$y = \frac{1}{2} \ln \frac{E + p_z c}{E - p_z c}$$

Pseudo -rapidity

$$\eta = \frac{1}{2} \ln \left(\frac{|\mathbf{p}| + p_{\mathrm{L}}}{|\mathbf{p}| - p_{\mathrm{L}}} \right) =$$

$$\eta \equiv -\ln \left[\tan \left(\frac{\theta}{2} \right) \right],$$

Outer radius = 2.8m
Inner radius = 0.8m
Length = 5 m

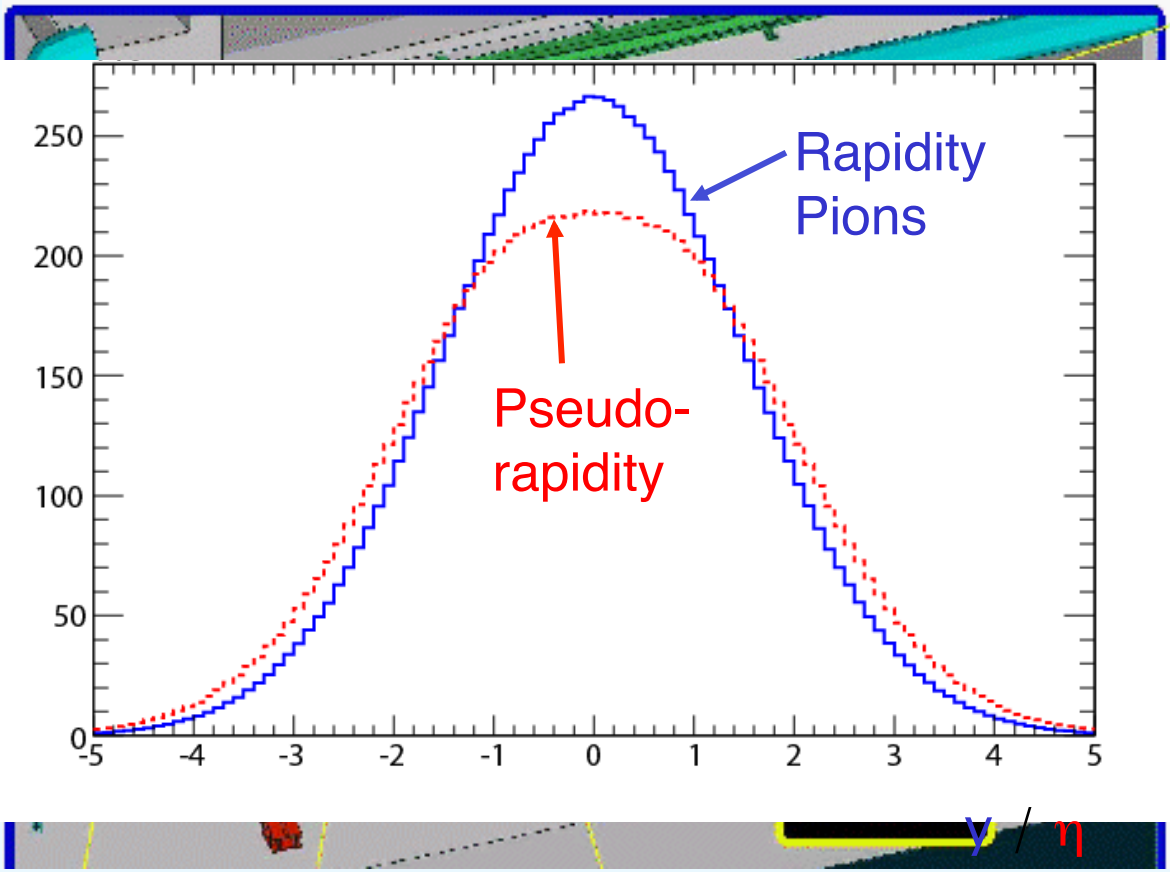
→Angle :
little larger than 45°

Example: pz = 1 GeV/c, p = 2 GeV/c,

Pseudo-rapidity = 0.5493
Rapidity pion = 0.5262, rapidity proton = 0.4878

Pseudo – rapidity (theta =45°)
Eta = 0.88

Alice Experiment and TPC



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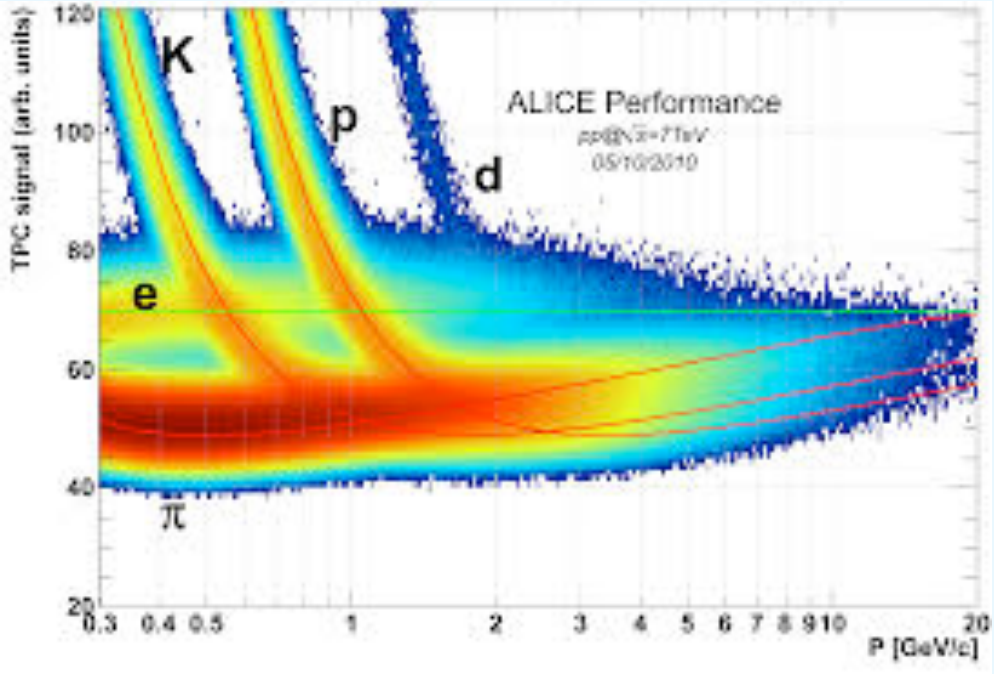
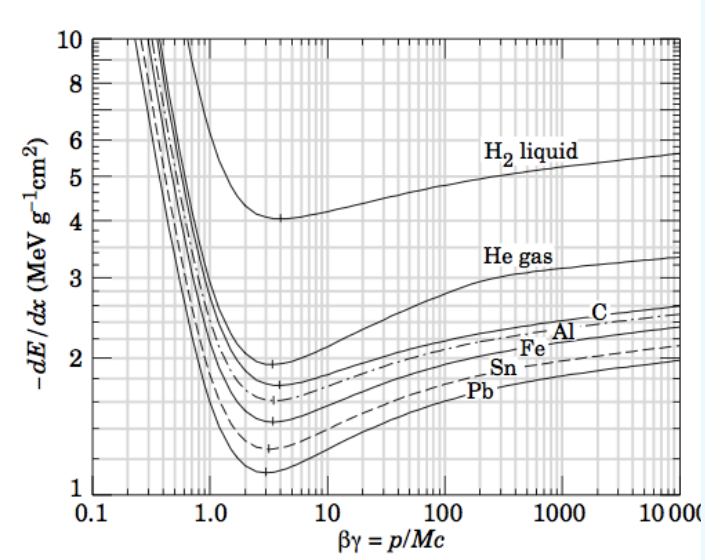
Energy loss in the TPC (ALICE)





- $dE/dx \approx 1/\beta^2 = M^2 c^2 \gamma^2 / p^2 \rightarrow \gamma\beta = p/Mc$

($1/v^2 = M^2 \gamma^2 / p^2$) velocity dependence

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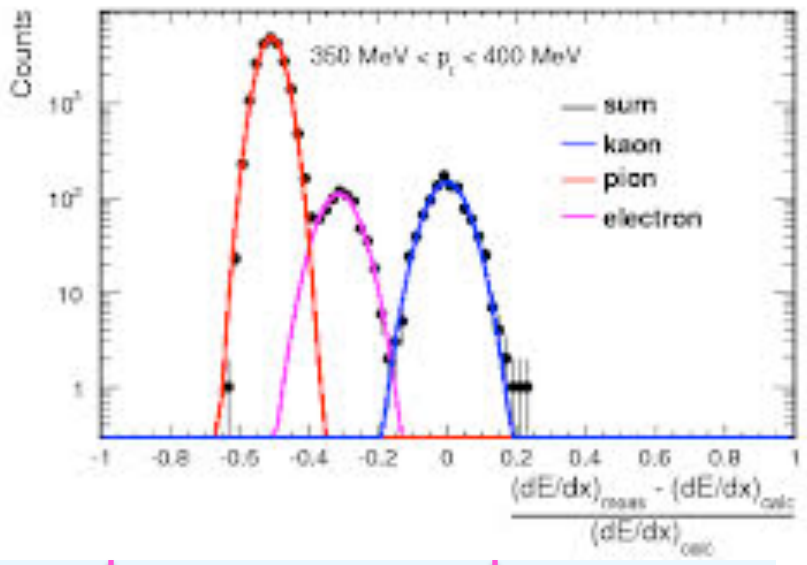

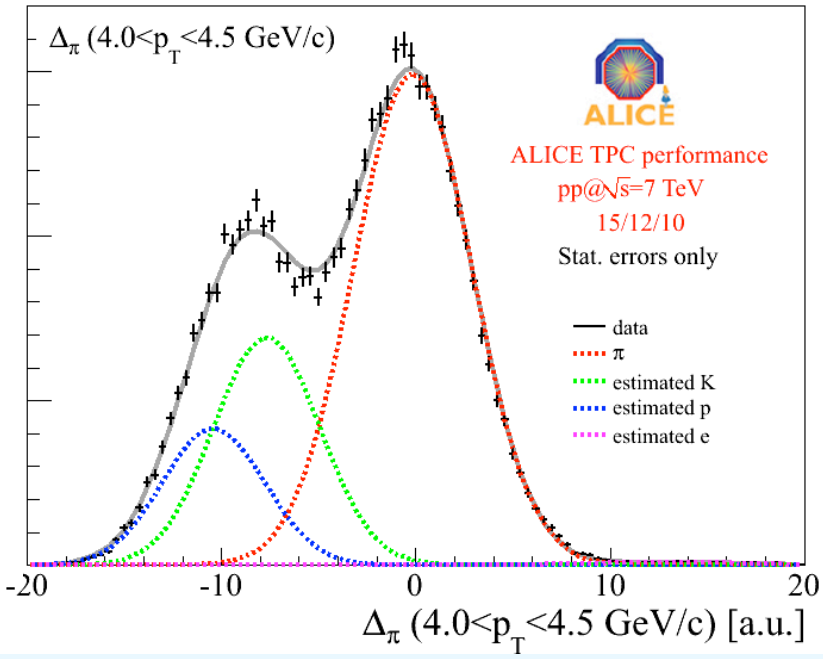

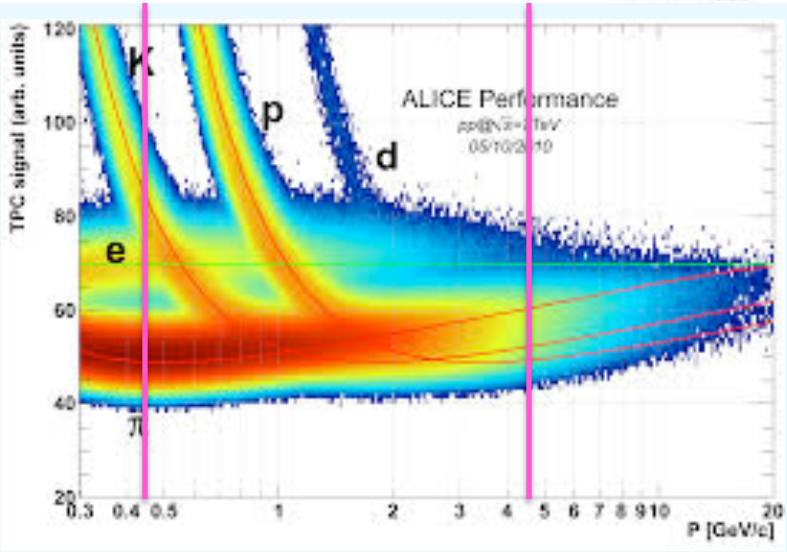

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