

# Mini-Prototype Drift Chambers For CLAS12

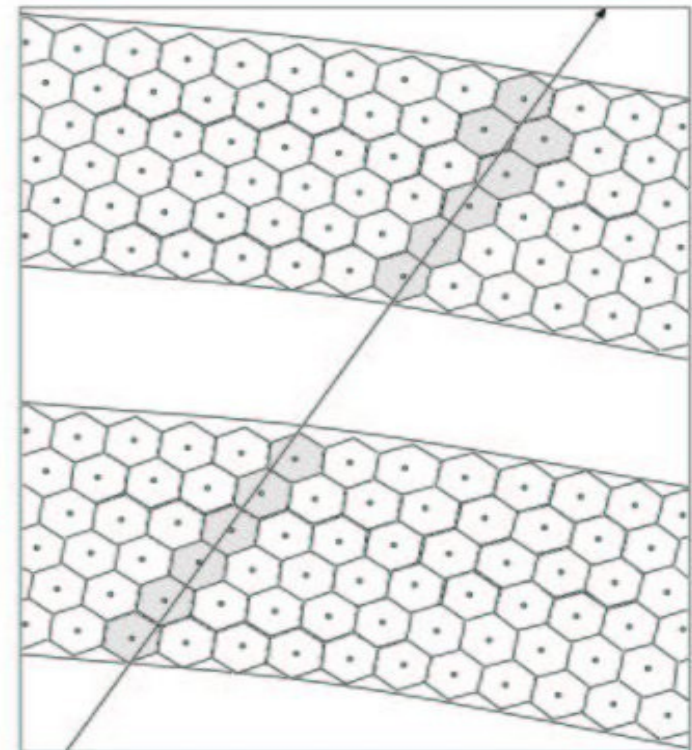
## Outline

- Drift Chamber
- Noise Measurements
- HV Plateau
- Efficiency vs Distance

# Drift Chamber

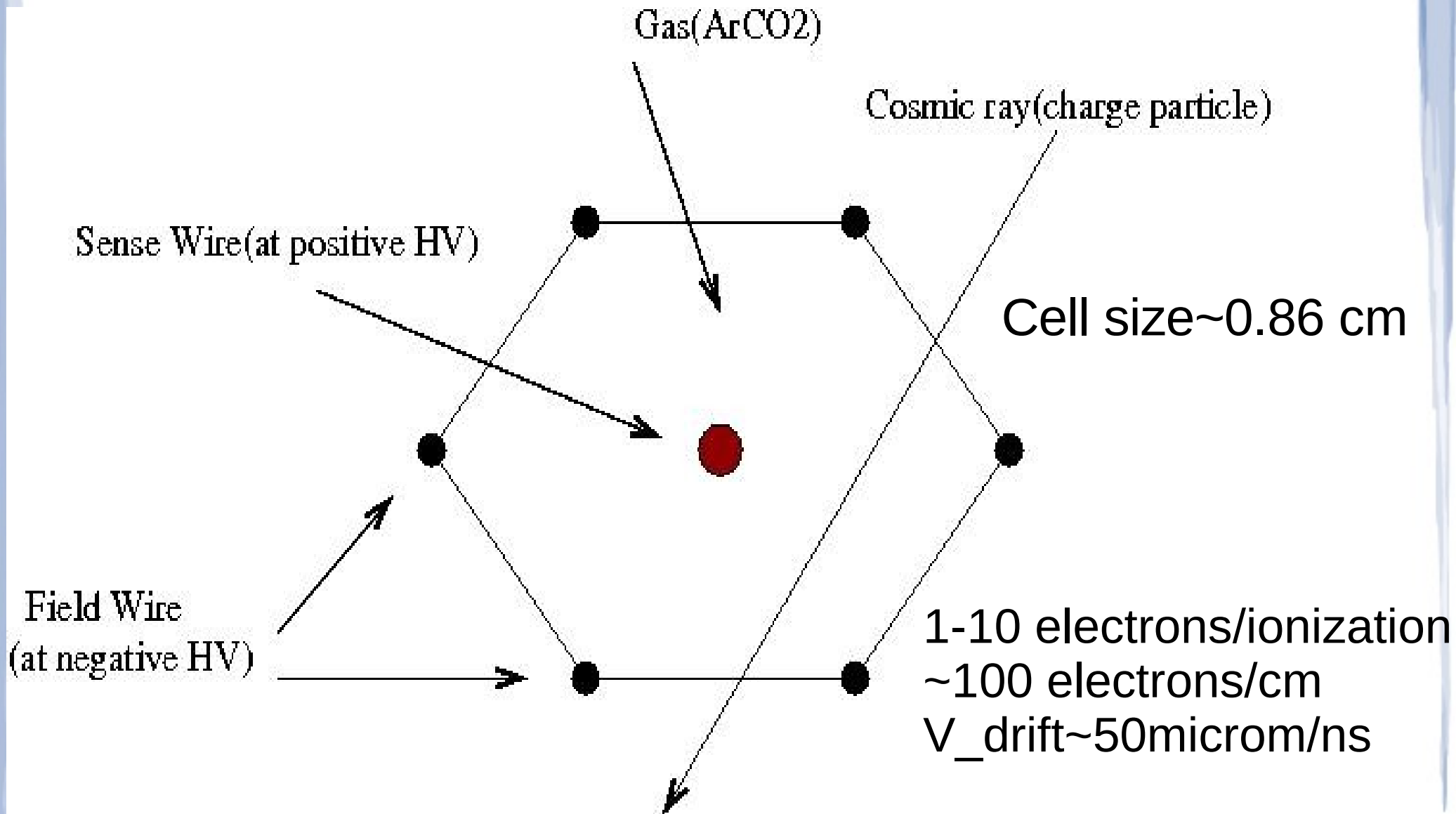


- Tracking System
- Large volume detector
- Low Cost

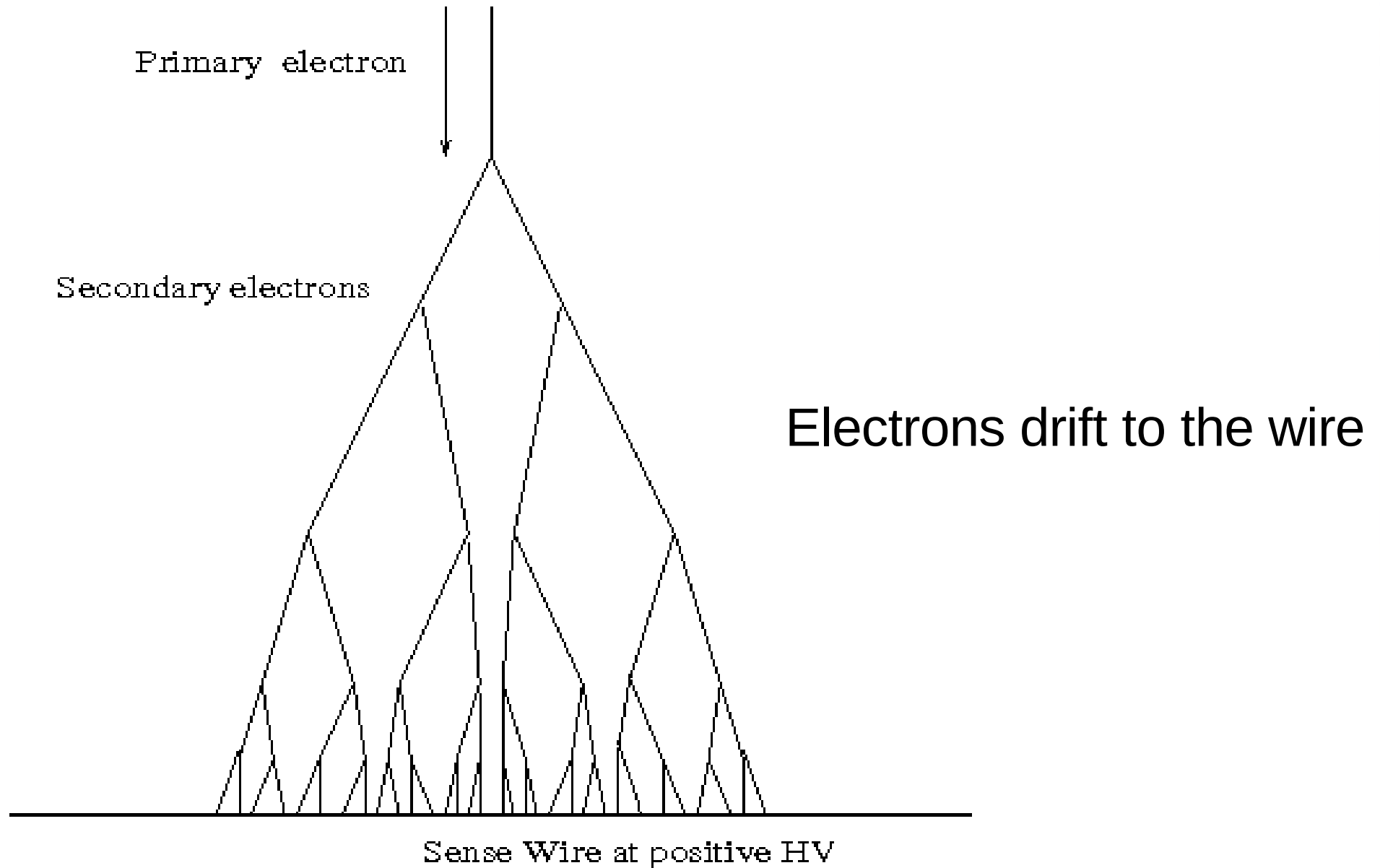


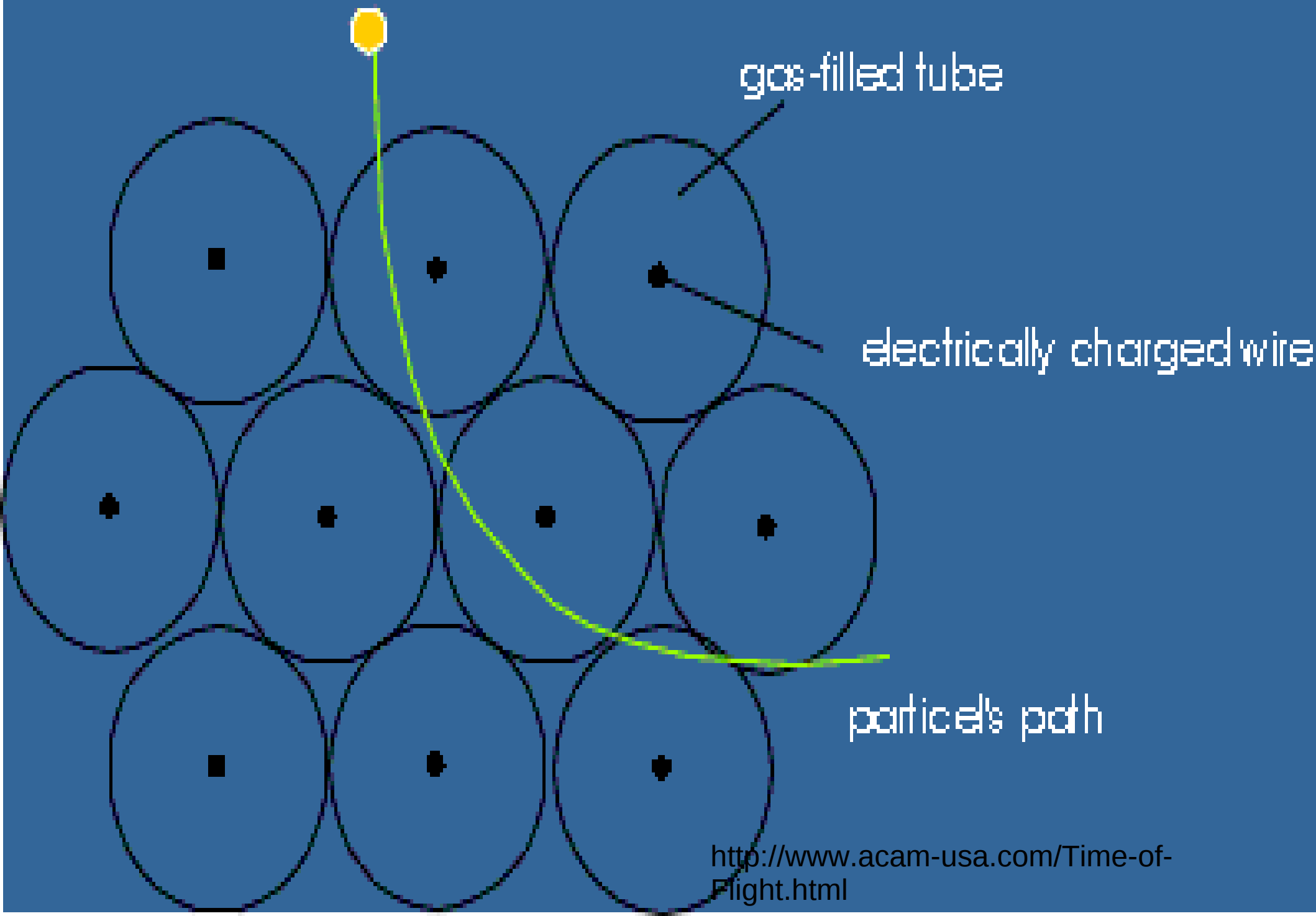
<http://www.jlab.org/~jacobsg/>

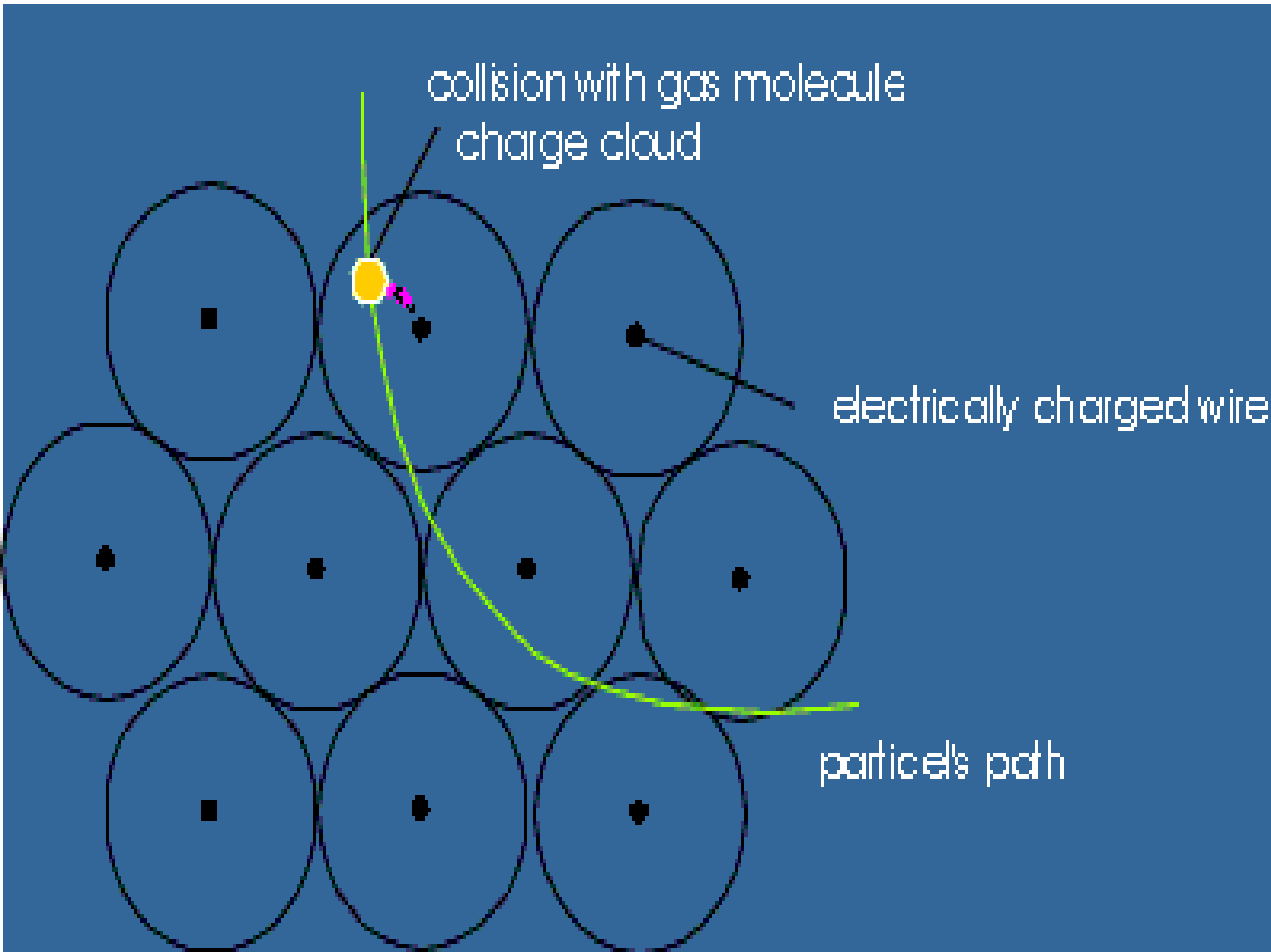
# Ionization by Particles in DC

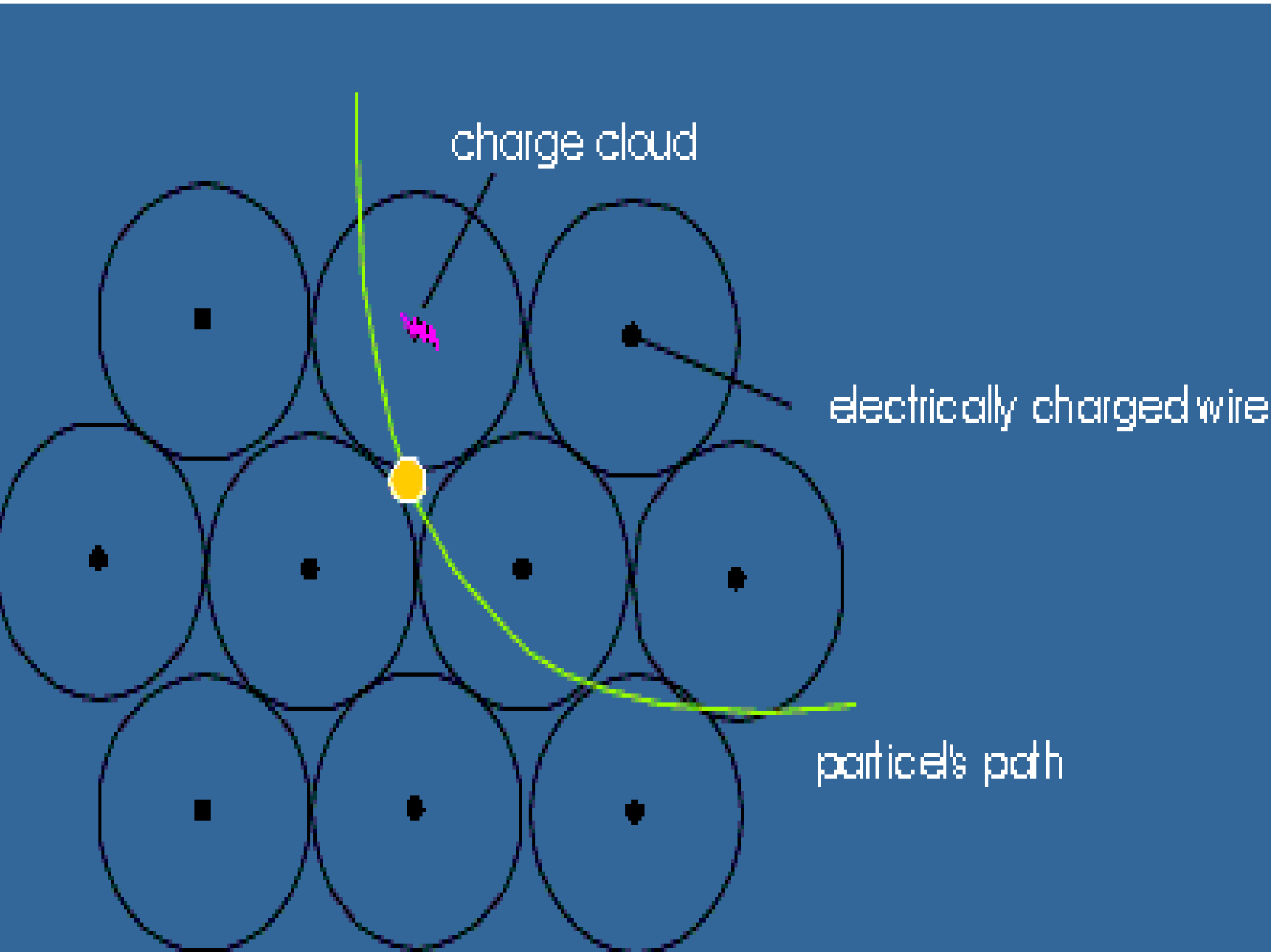


# The electron avalanche







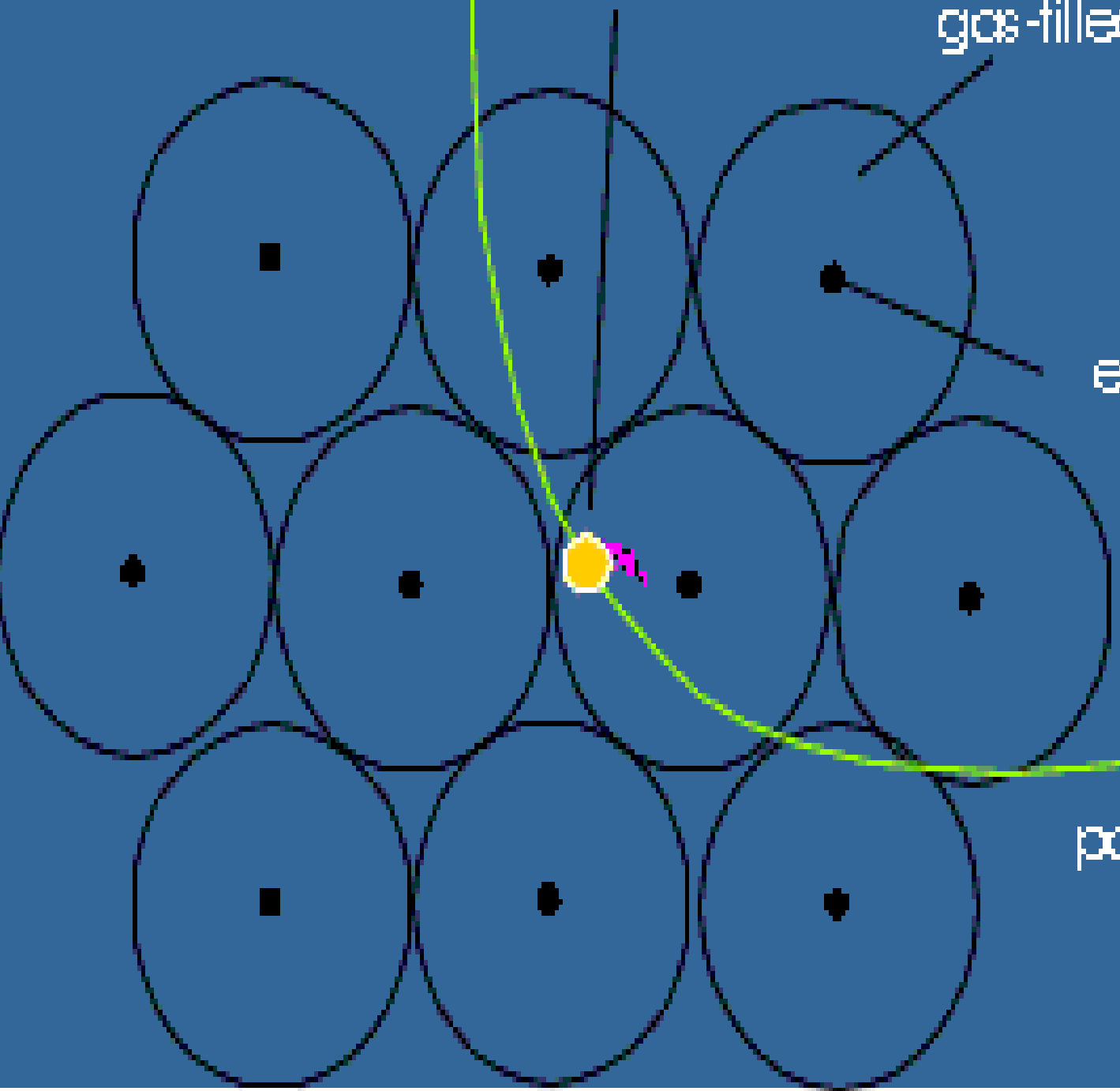


collision with gas molecule  
charge cloud

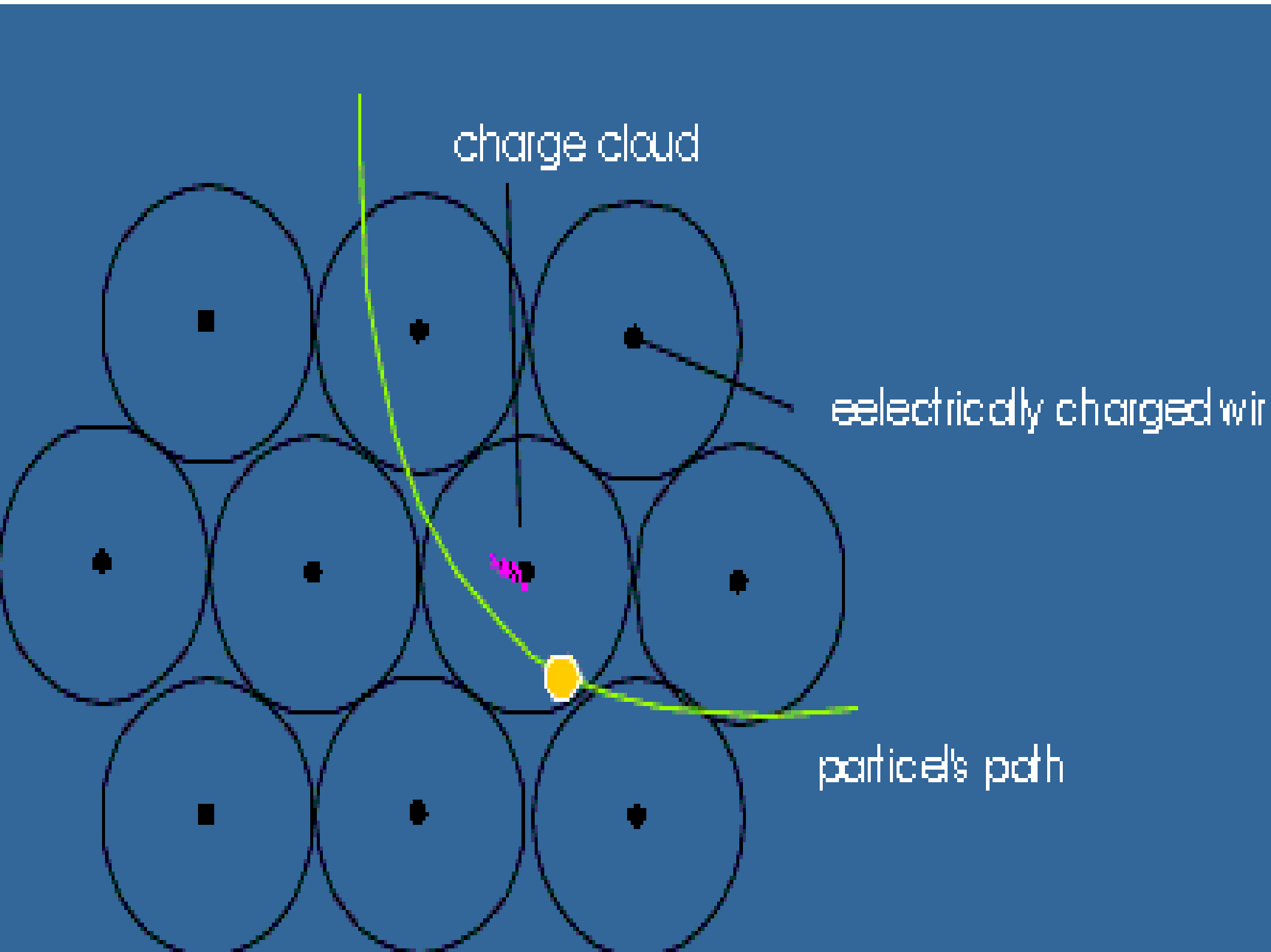
gas-filled tube

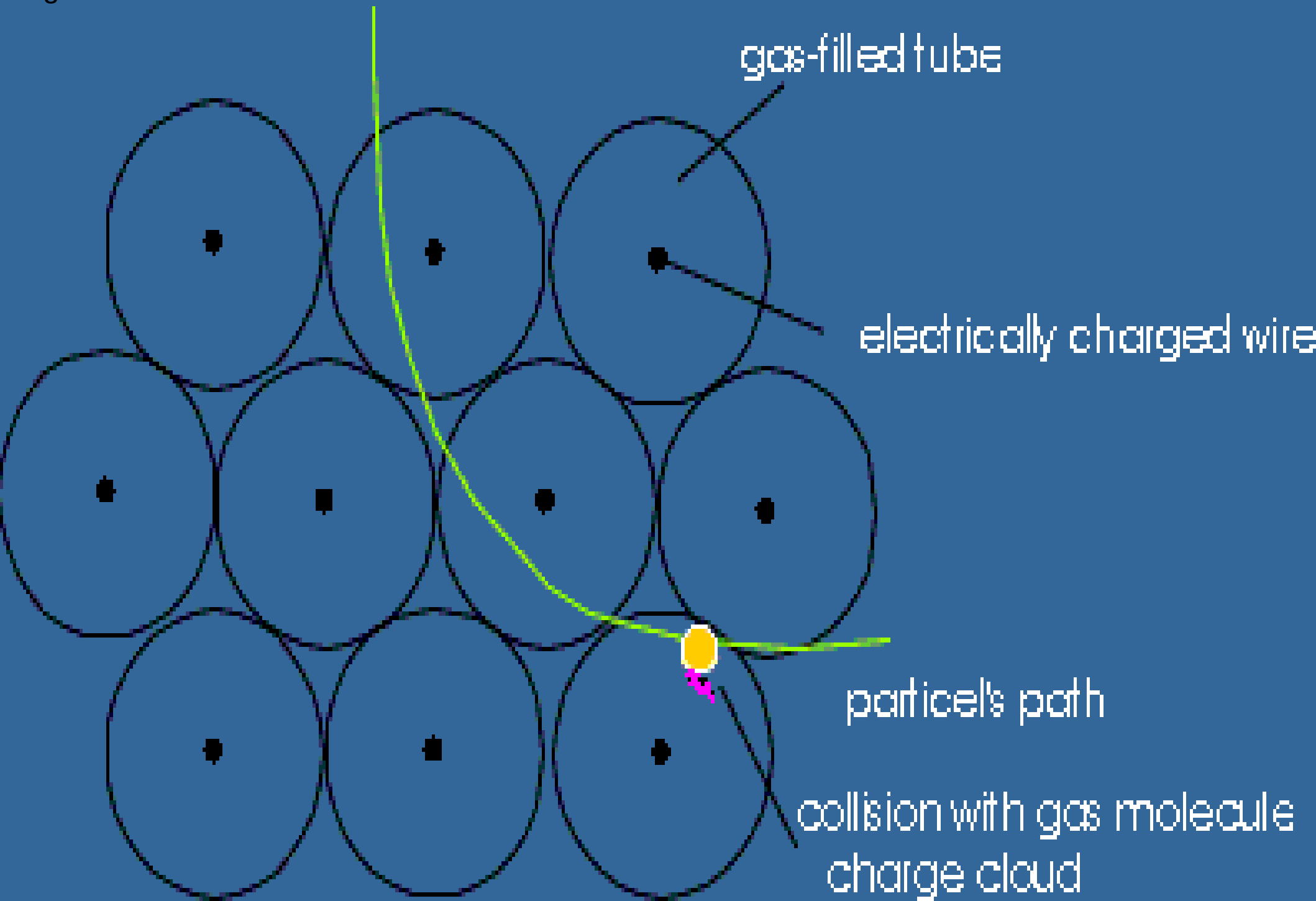
electrically charged wire

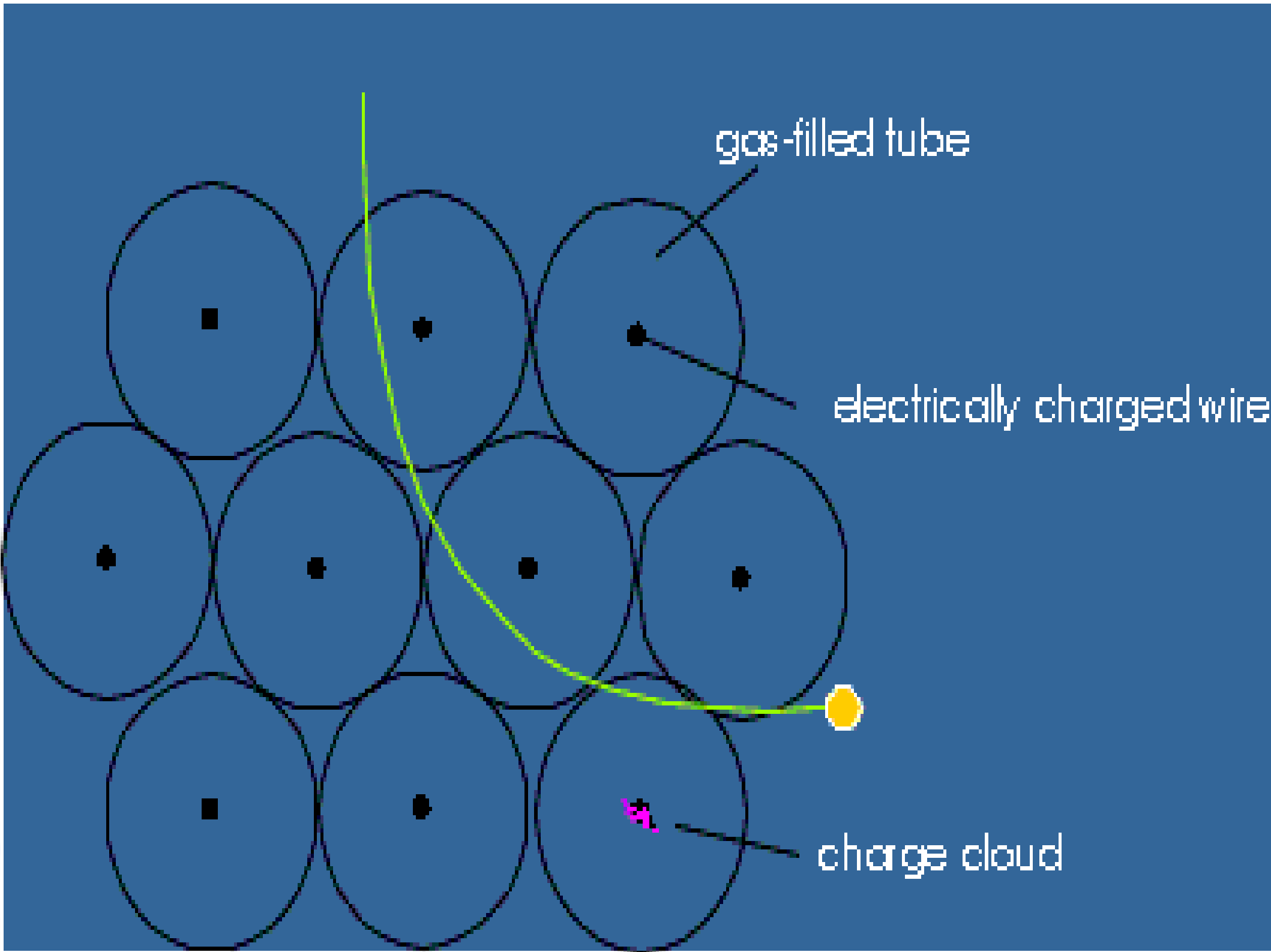
particle's path



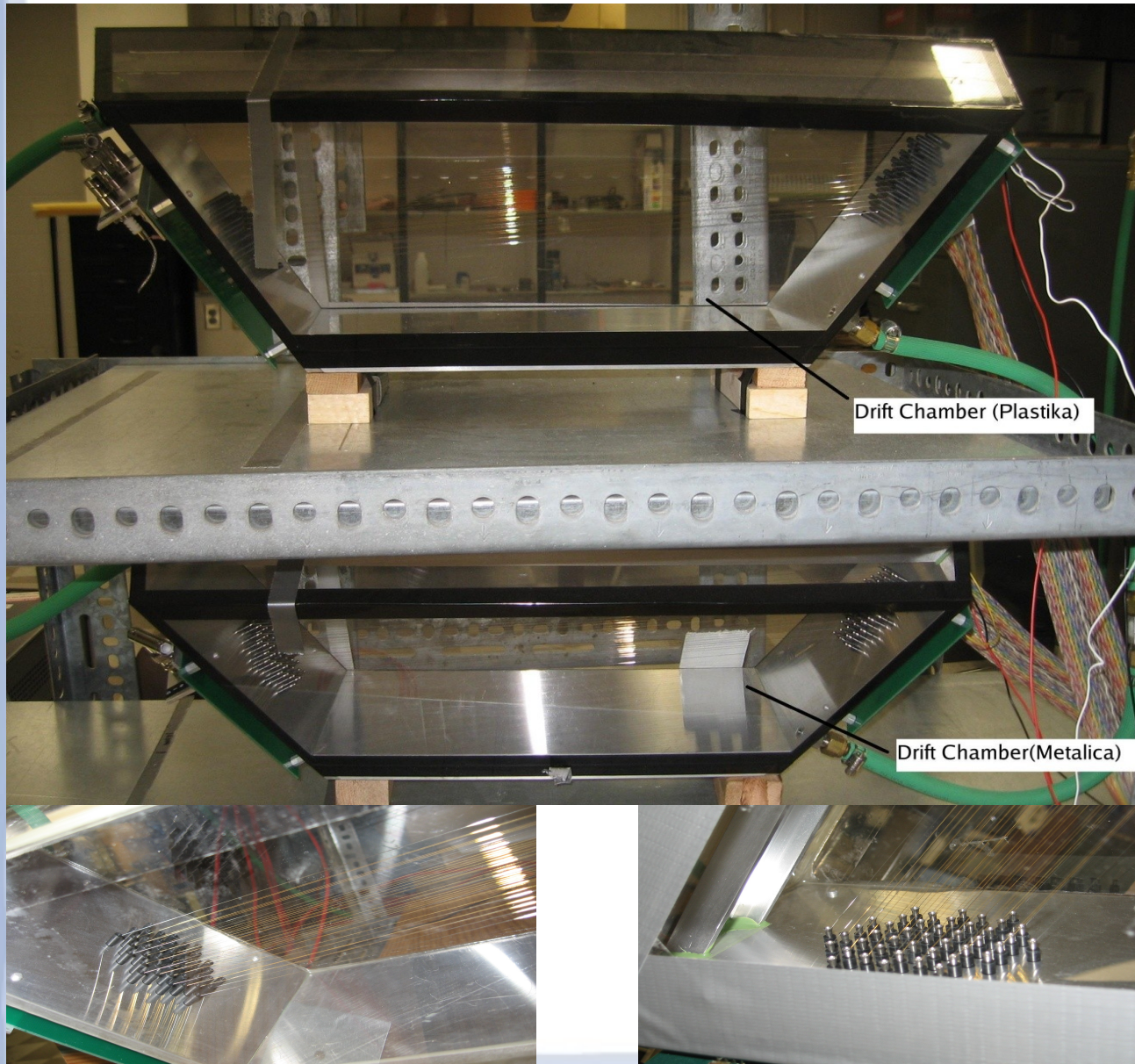








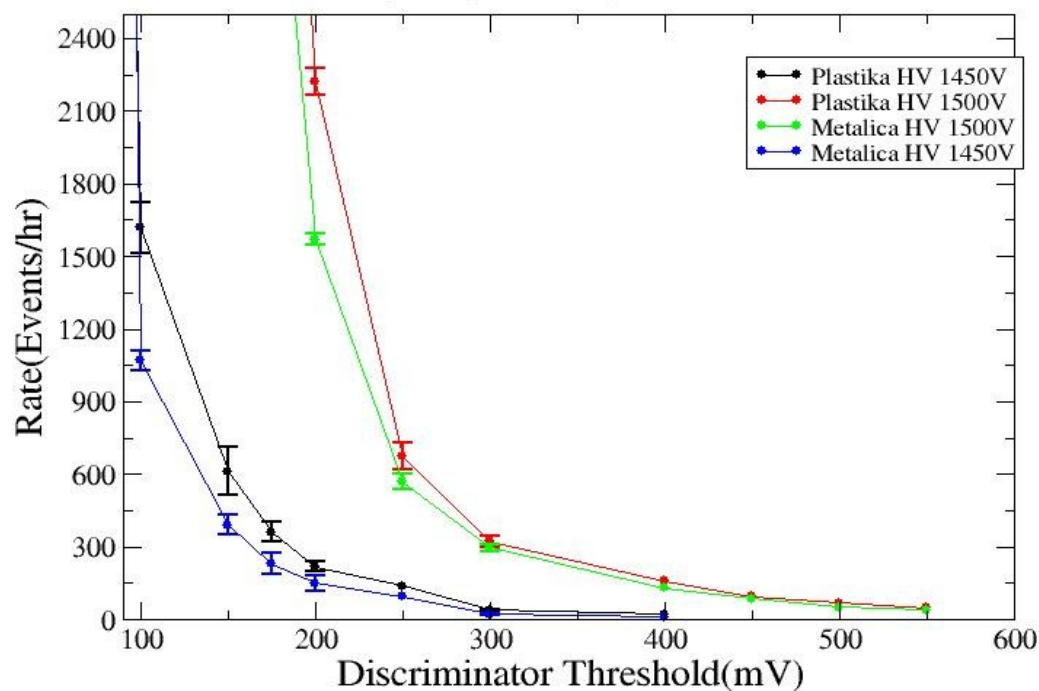
# Experimental Setup In LDS



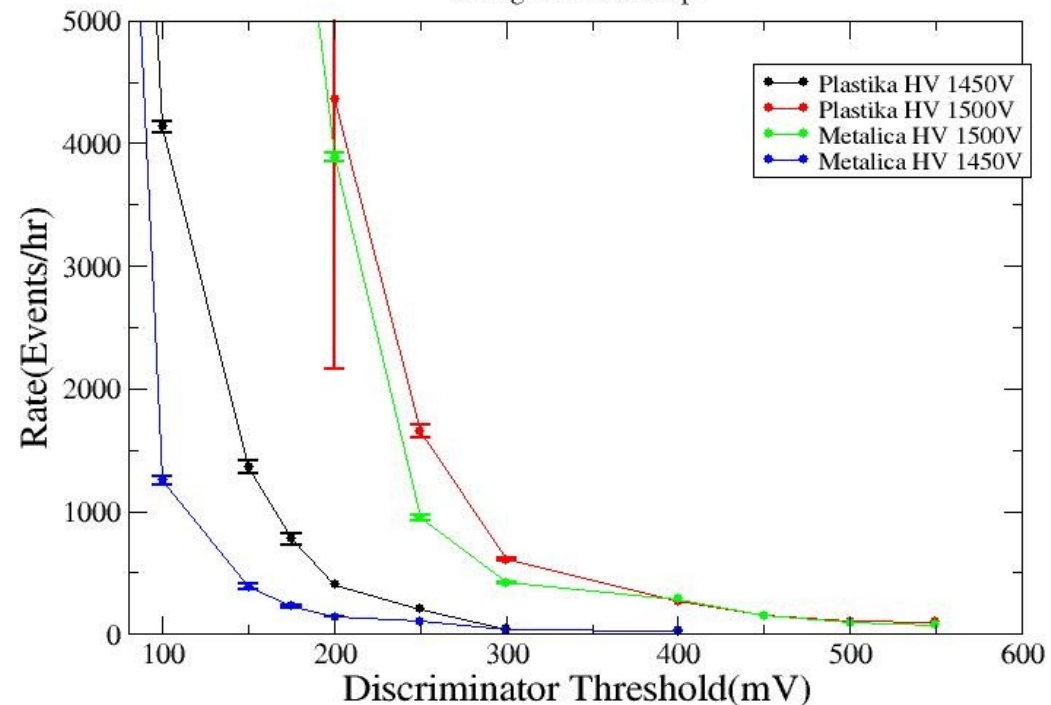
- Drift Chambers were stacked on top of each other
- High voltage and ionization gas ( $\text{ArCO}_2$ , 90/10) were connected in parallel
- Drift Chambers were operated at different high voltages
- Sense wire 4 was used to obtain results

# Noise Measurements Using Single Cosmic Events

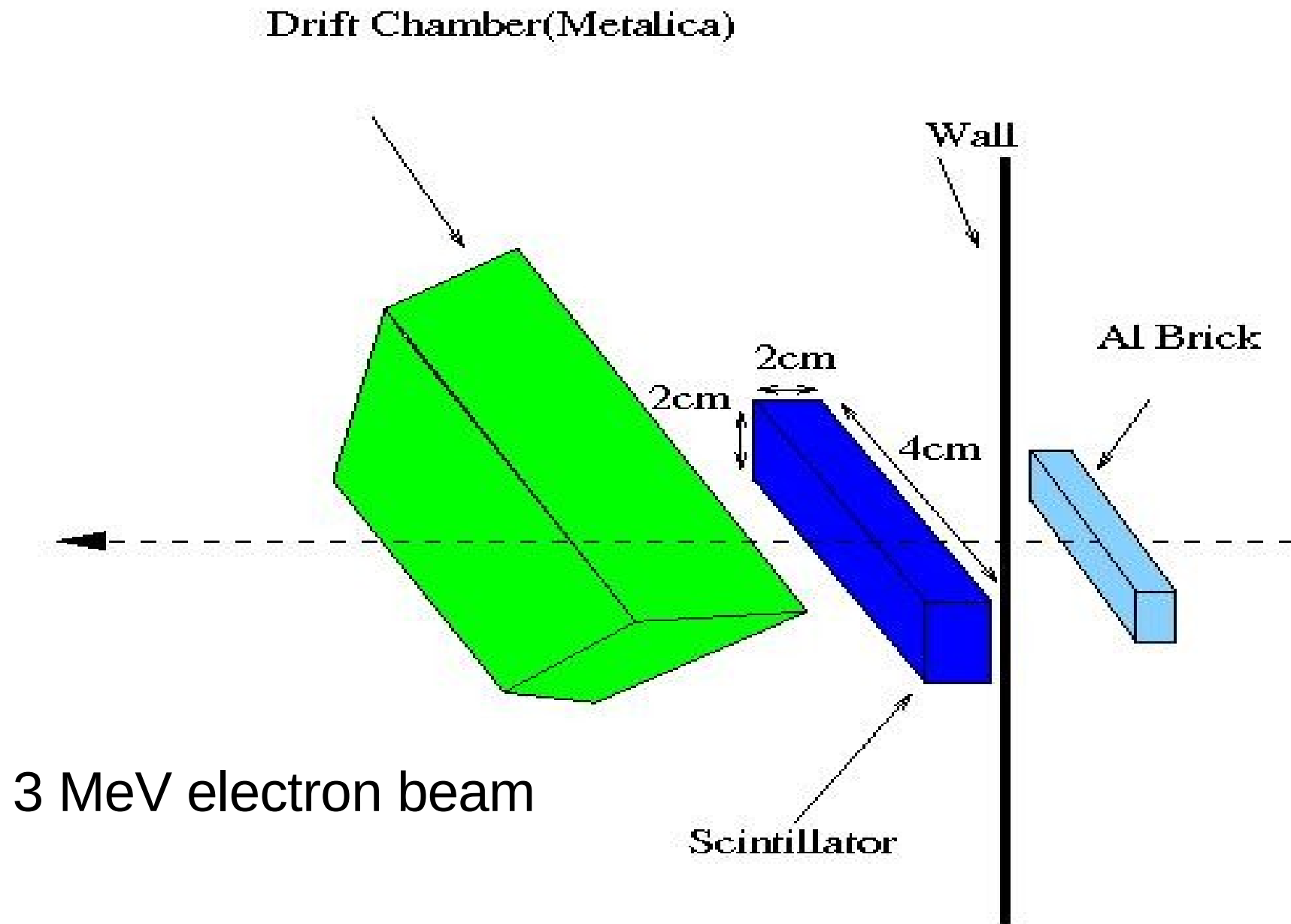
Discriminator Threshold vs Rate for DC  
Using Phillips Gain Amplifier Model 777



Discriminator Threshold vs Rate for DC  
Using VPI PostAmp

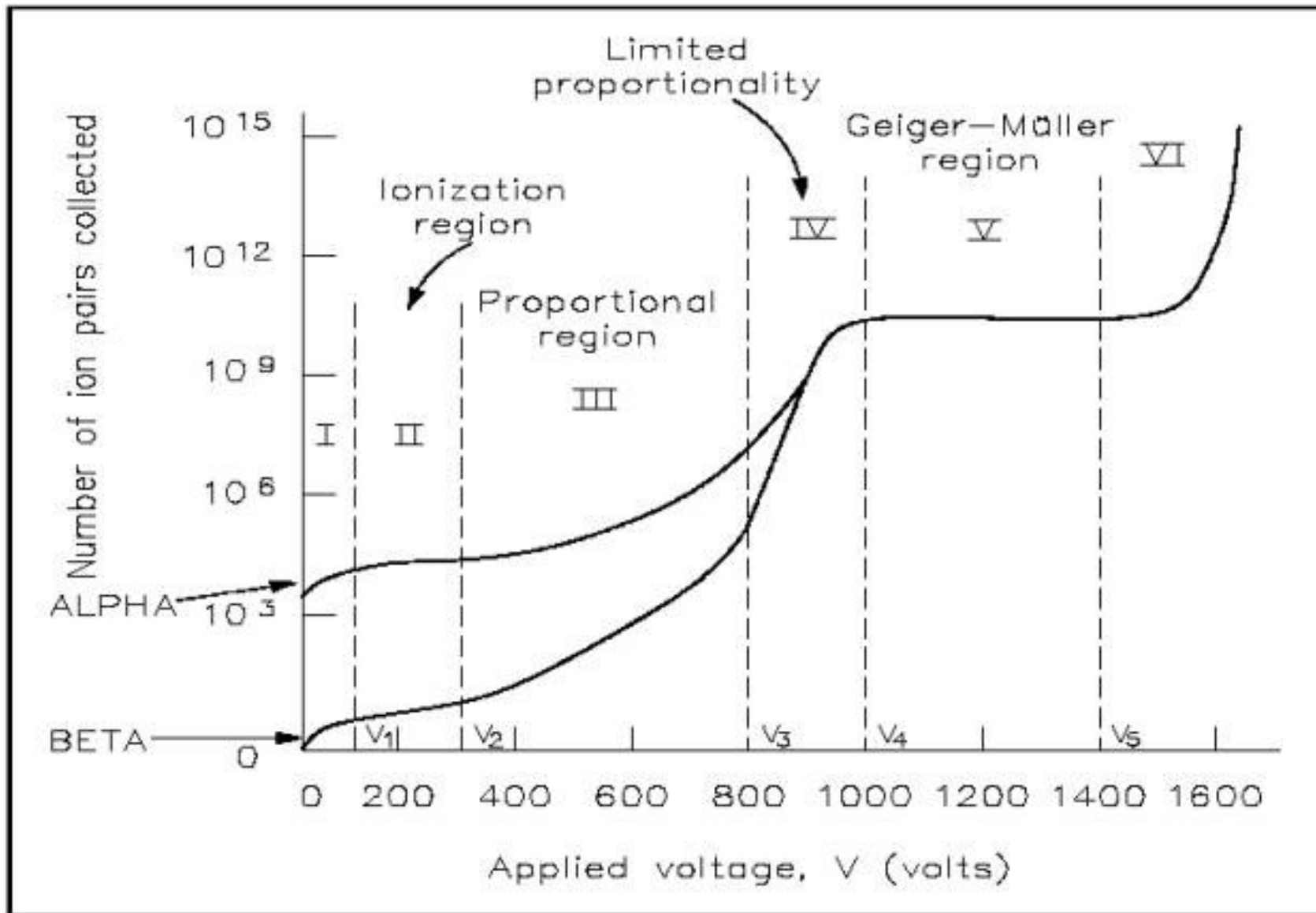


# Experimental Setup in HRRL



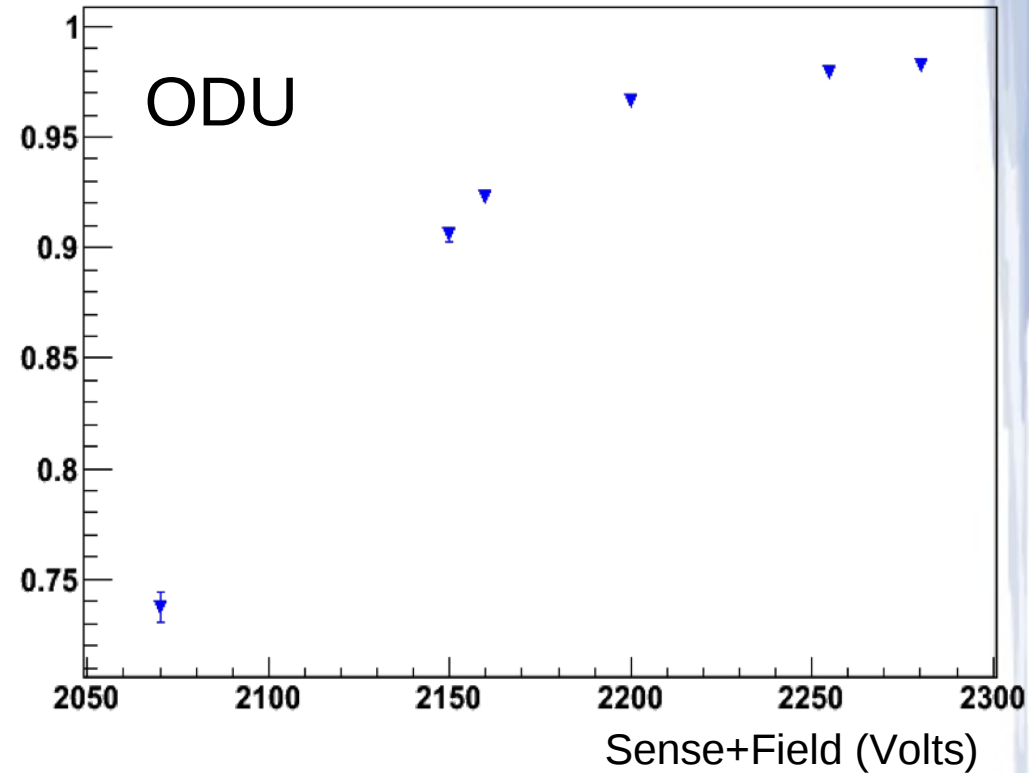
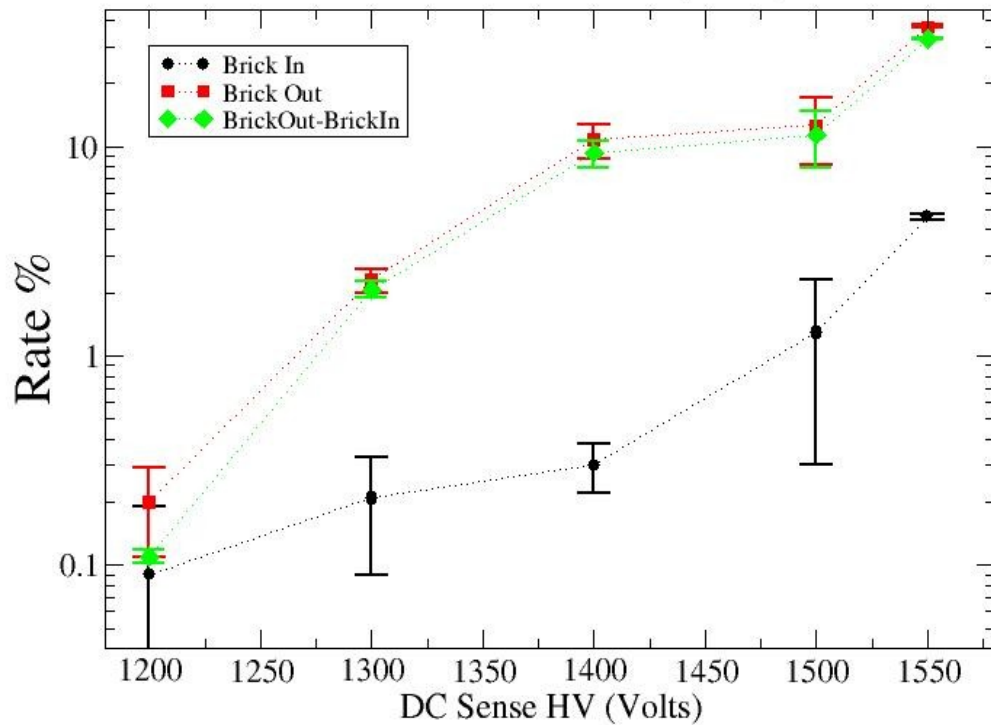


# HV Plateau



# Drift Chamber HV Plateau Measurement At ISU vs ODU

Drift Chamber Sense HV vs Rate  
BrickIn, BrickOut & Brick(Out-In)



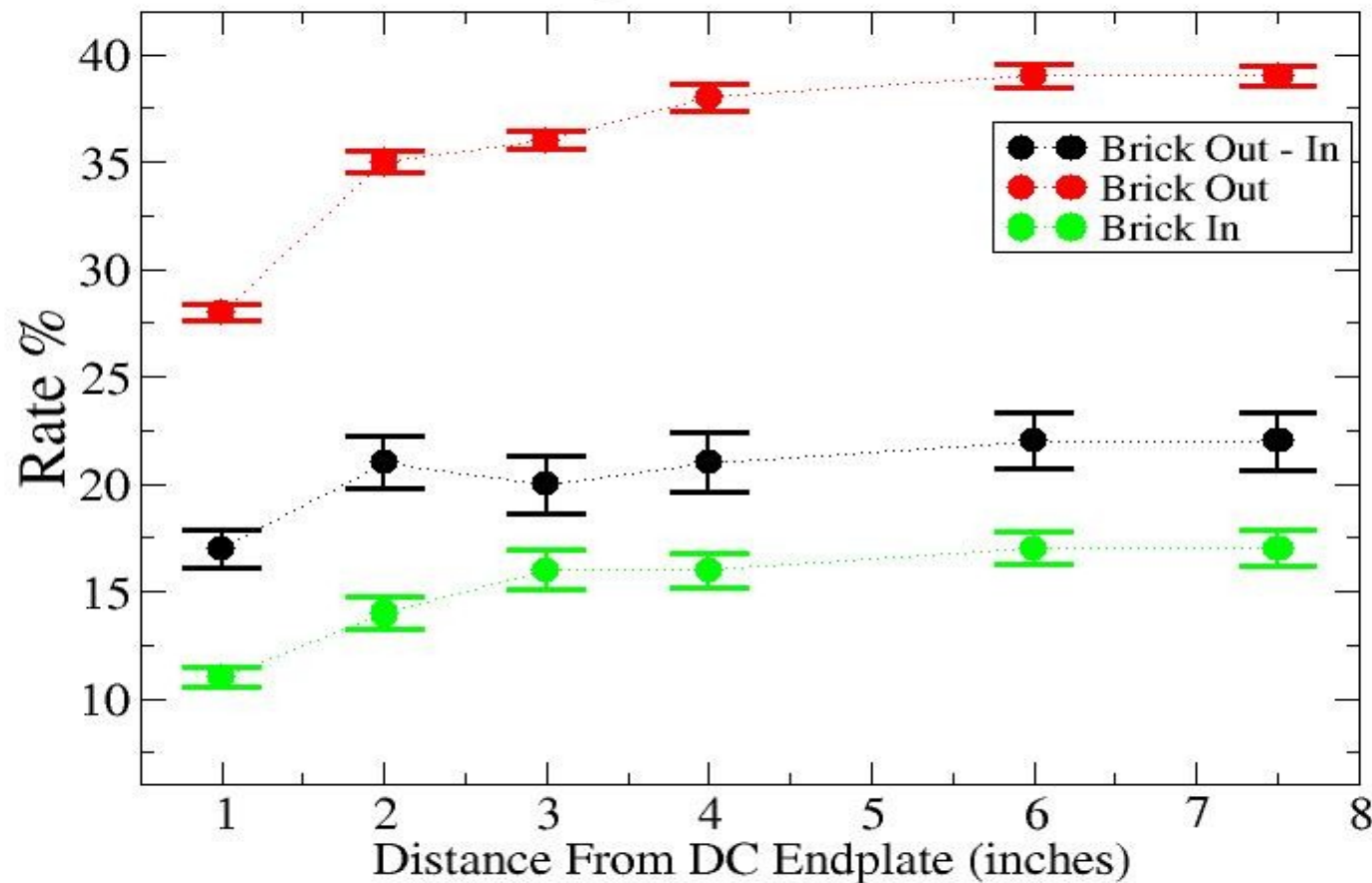
$$Rate\% \equiv \left( \left[ \frac{\text{Counts(DCSenseWire4 + Front Scint + RF)}}{\text{RF Pulses}} \right]_{\text{BrickOut}} - \left[ \frac{\text{Counts(DCSenseWire4 + Front Scint + RF)}}{\text{RF pulses}} \right]_{\text{BrickIn}} \right) \times 100\%$$



# Distance vs Efficiency

## Distance From DC Endplate vs Rate

Using ADC Measurements



$$\text{Rate}\% = \frac{\text{ADCCounts}(FC > 1000 \text{ ADC} > 80)}{\text{ADCCounts}(FC > 1000)} \times 100\%$$

# Conclusions

- Metal endplates preferable
- Drift Chamber operation voltage  
Sense:Field=1450:-725
- Efficiency drops near endplates(?)

## Future Plans

Improve Distance vs Efficiency  
measurements