

# Mini-Prototype Drift Chambers For CLAS12

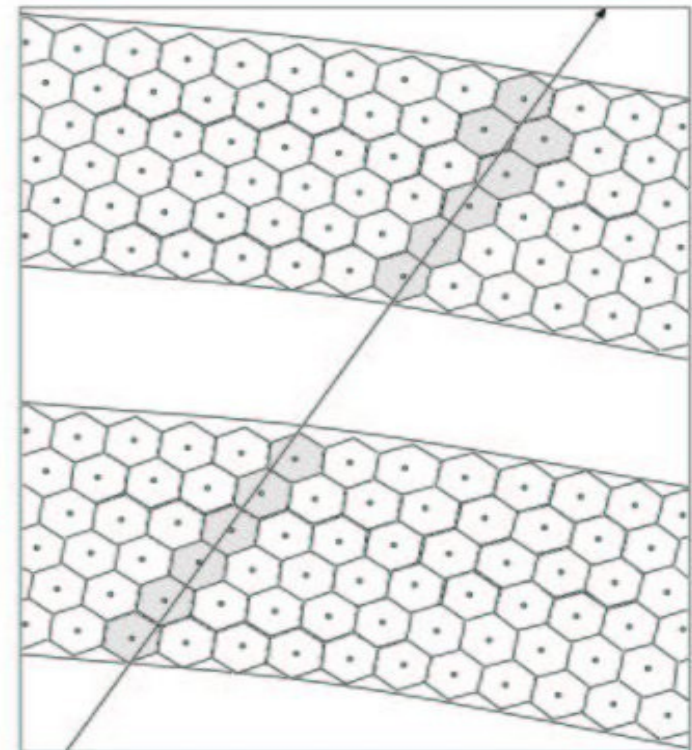
## Outline

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

# Drift Chamber

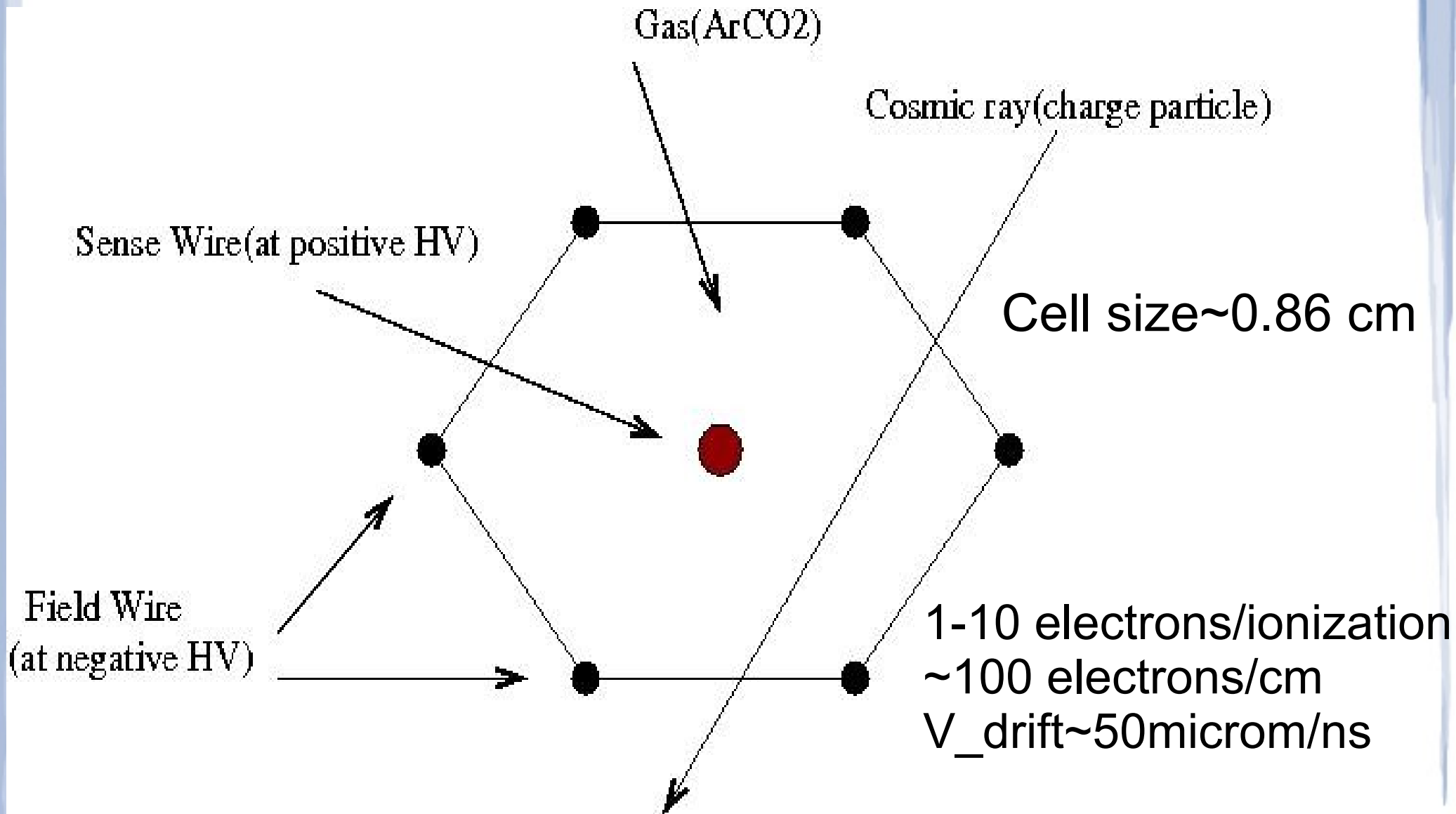


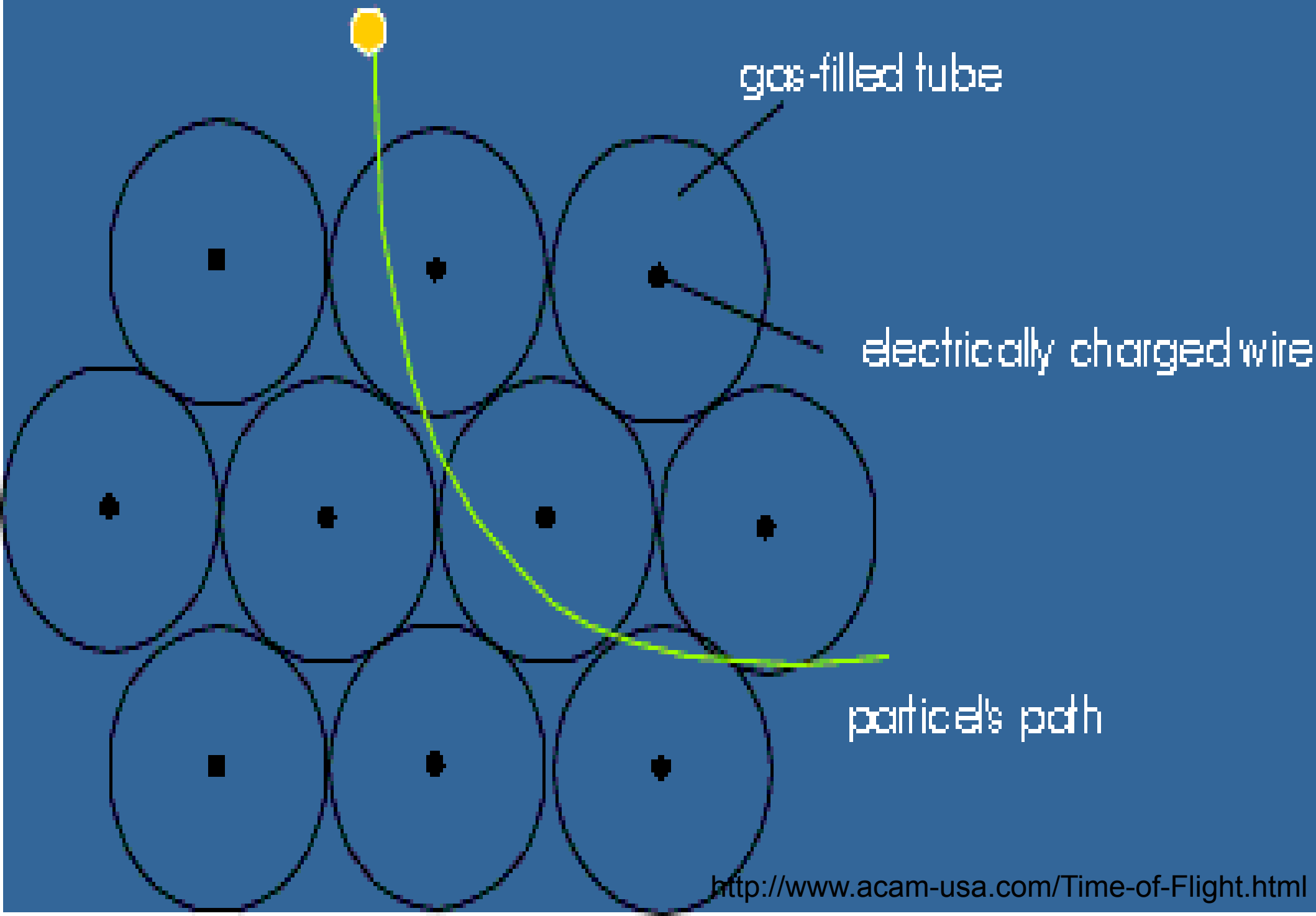
- Tracking System
- Large volume detector
- Low Cost

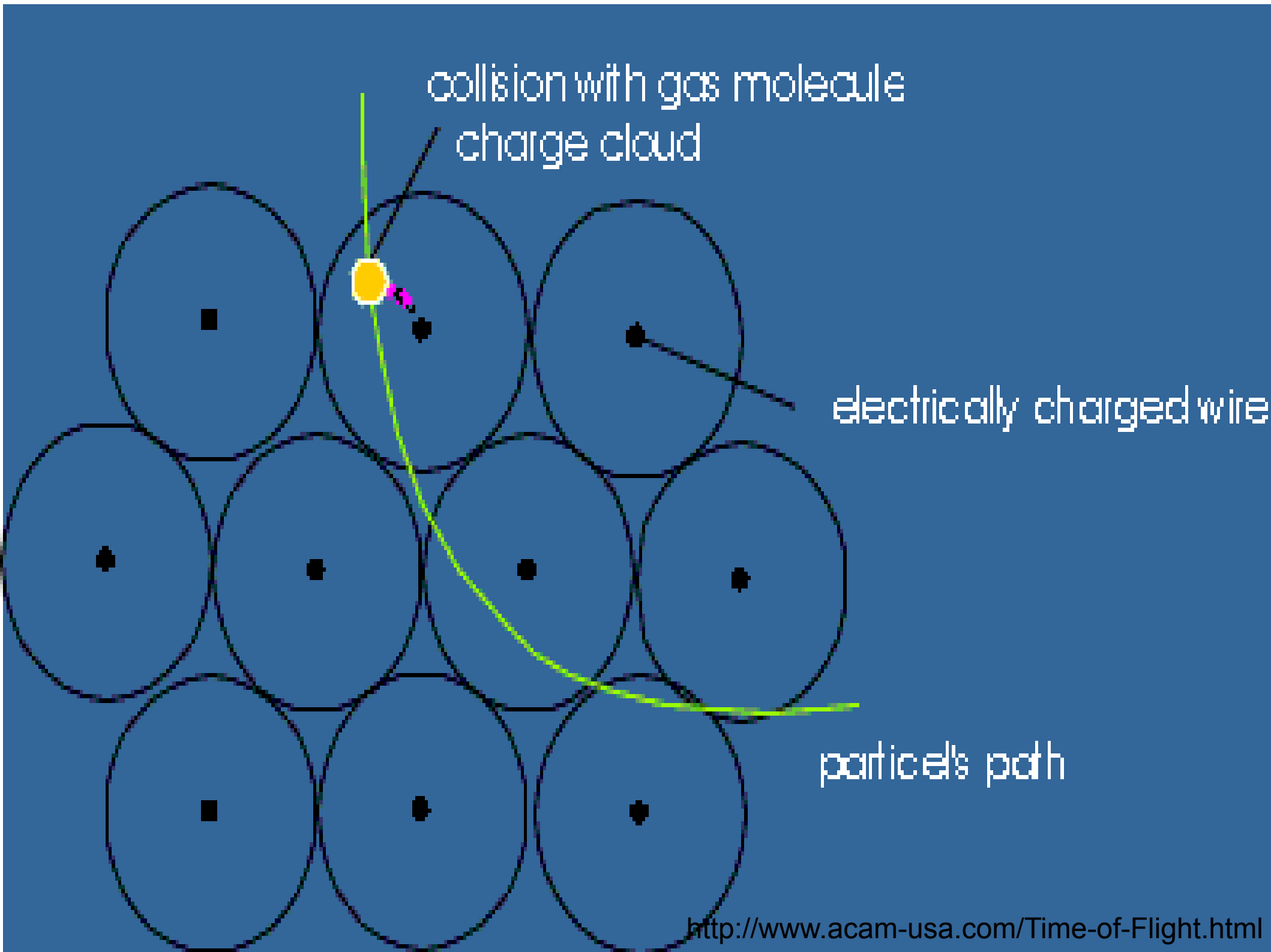


<http://www.jlab.org/~jacobs/>

# Ionization by Particles in DC



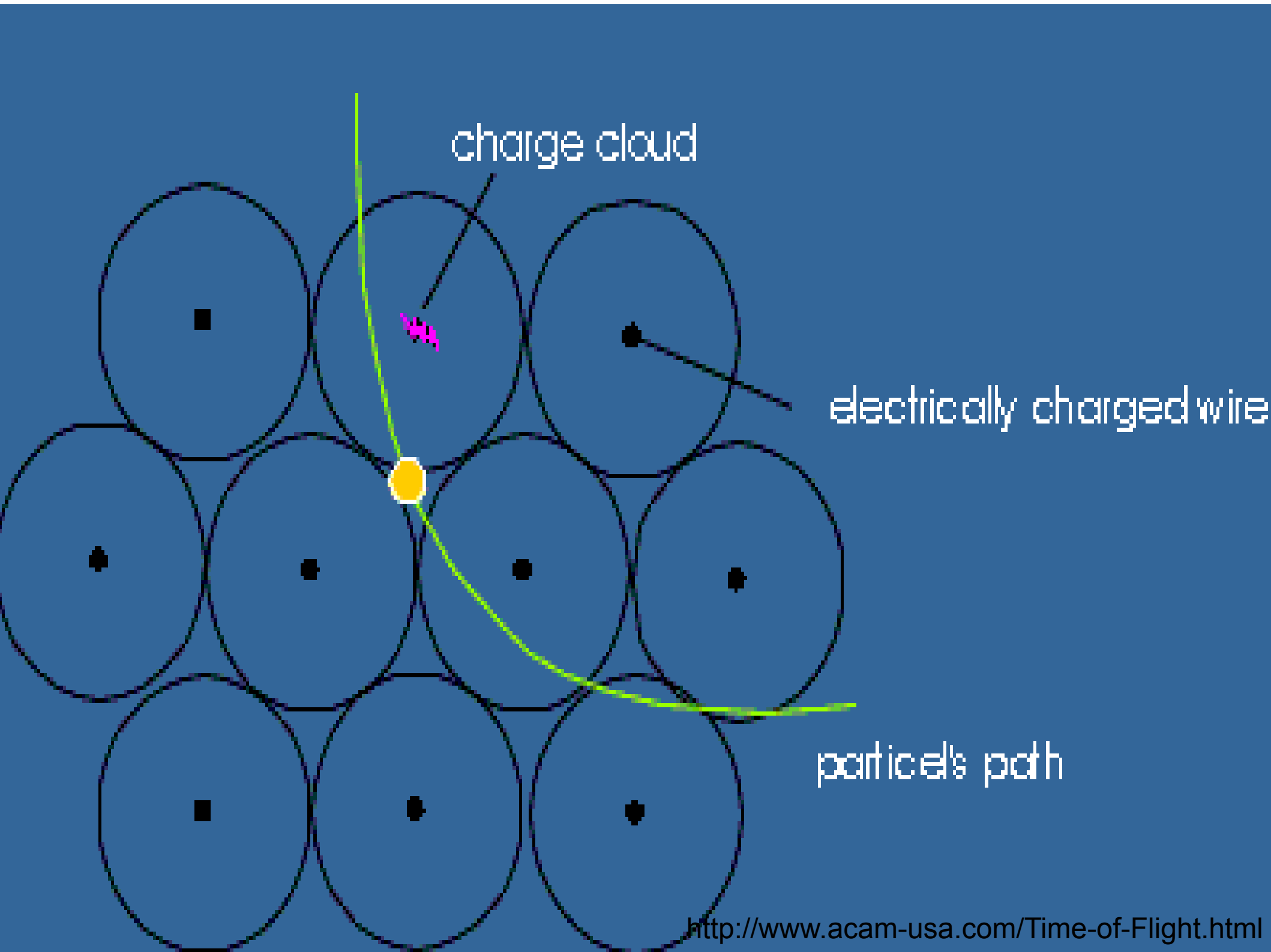




collision with gas molecule  
charge cloud

electrically charged wire

particle's path



charge cloud

electrically charged wire

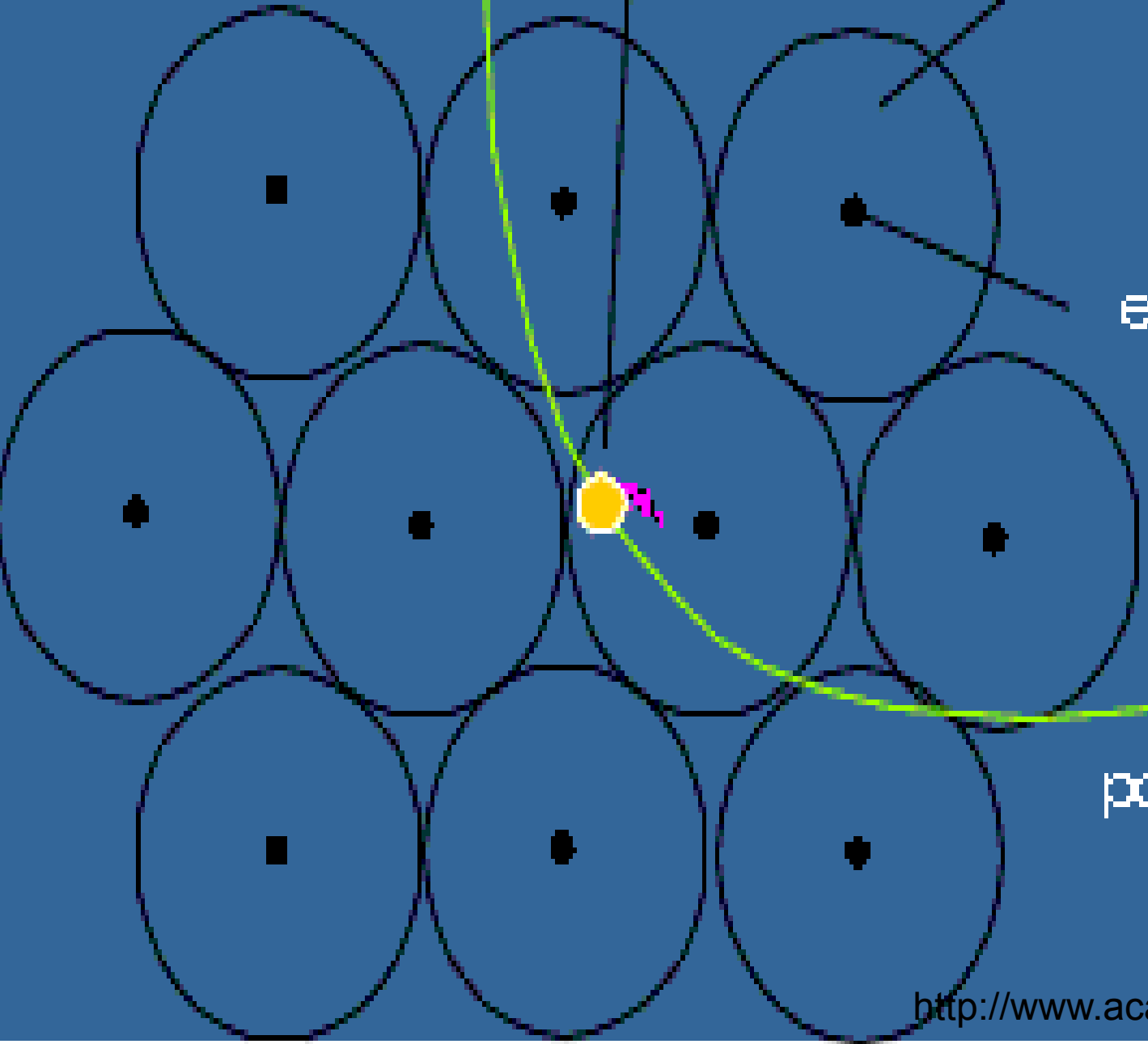
particle's path

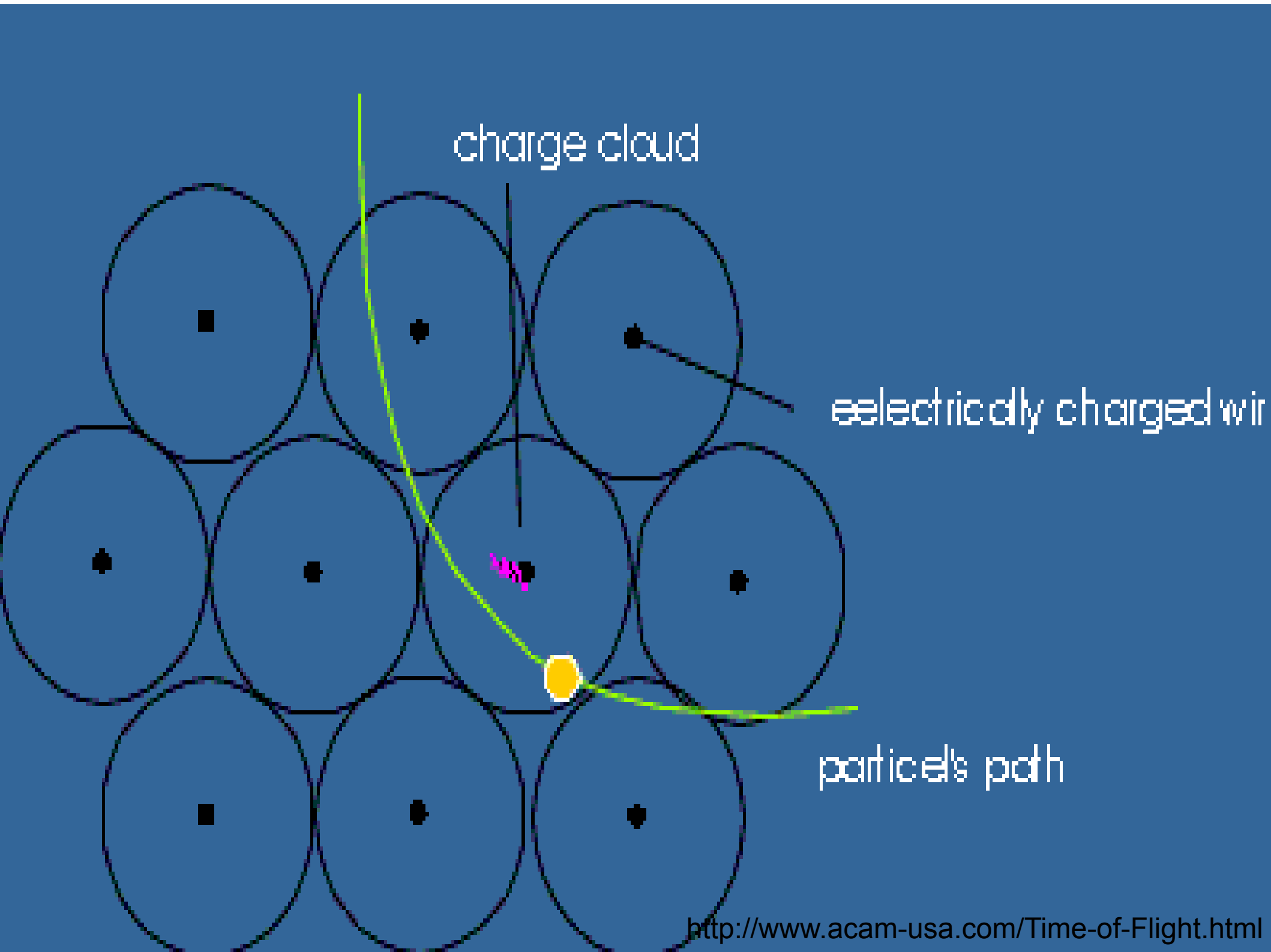
collision with gas molecule  
charge cloud

gas-filled tube

electrically charged wire

particle's path



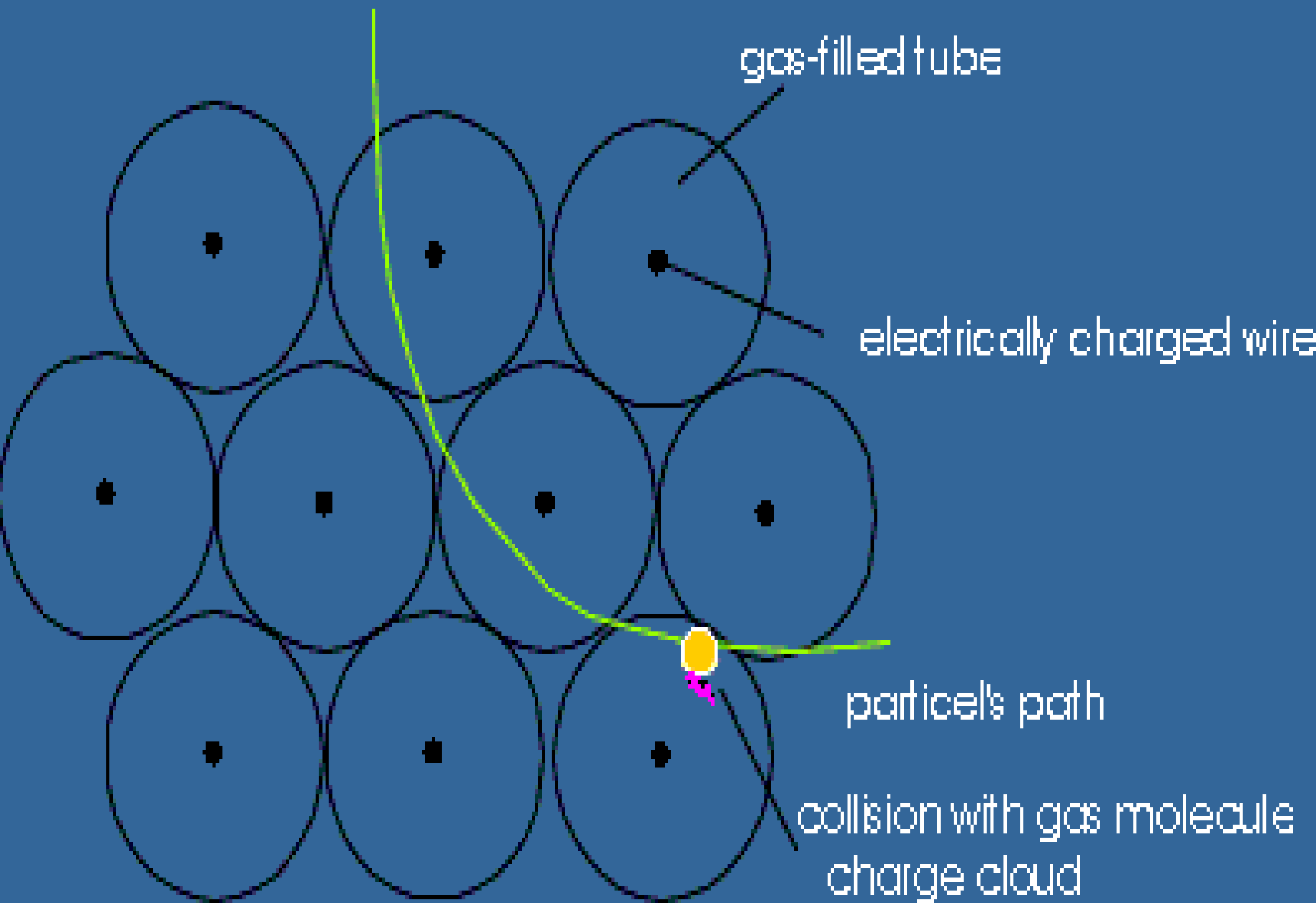


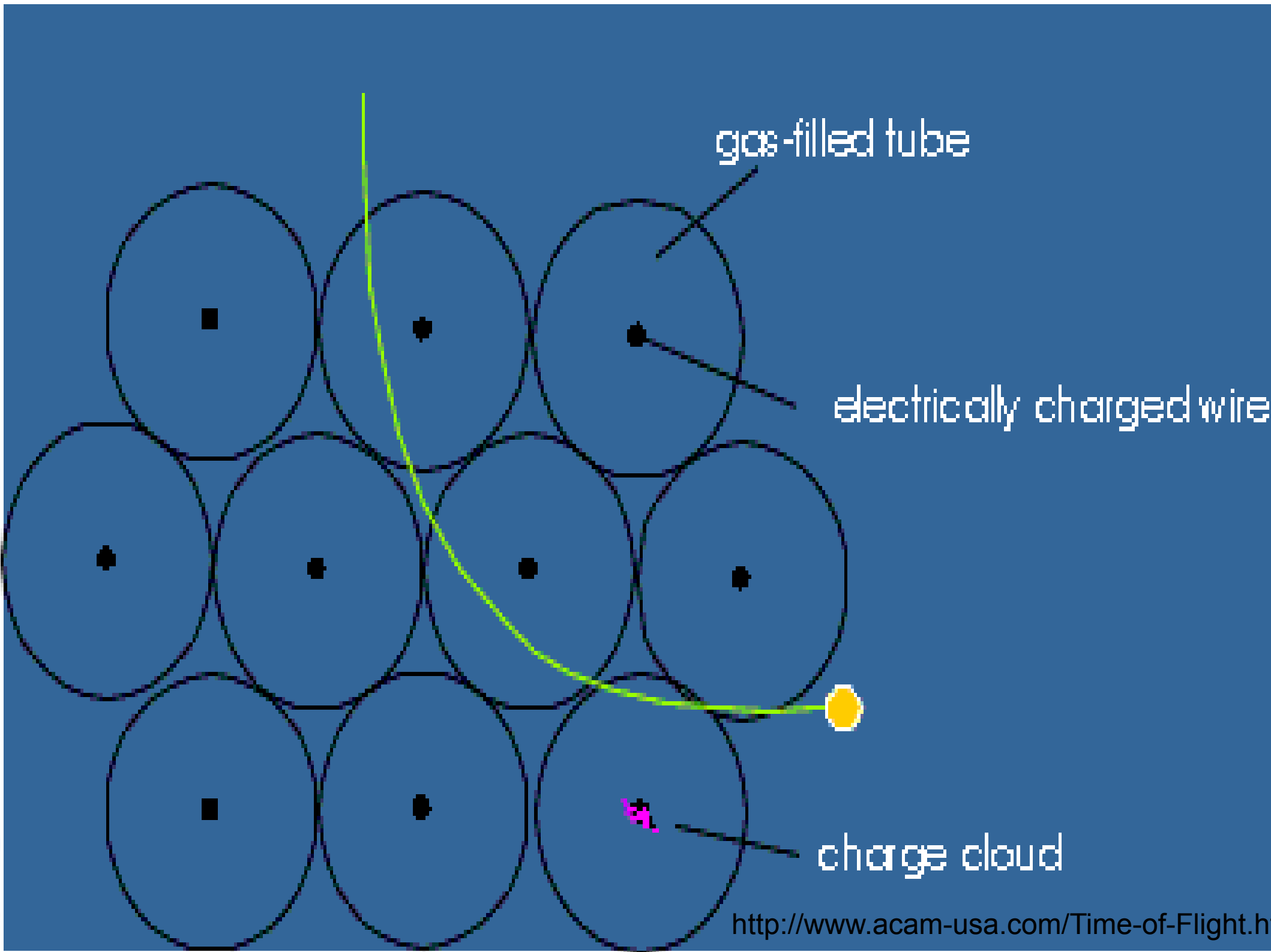
charge cloud

electrically charged wire

particle's path





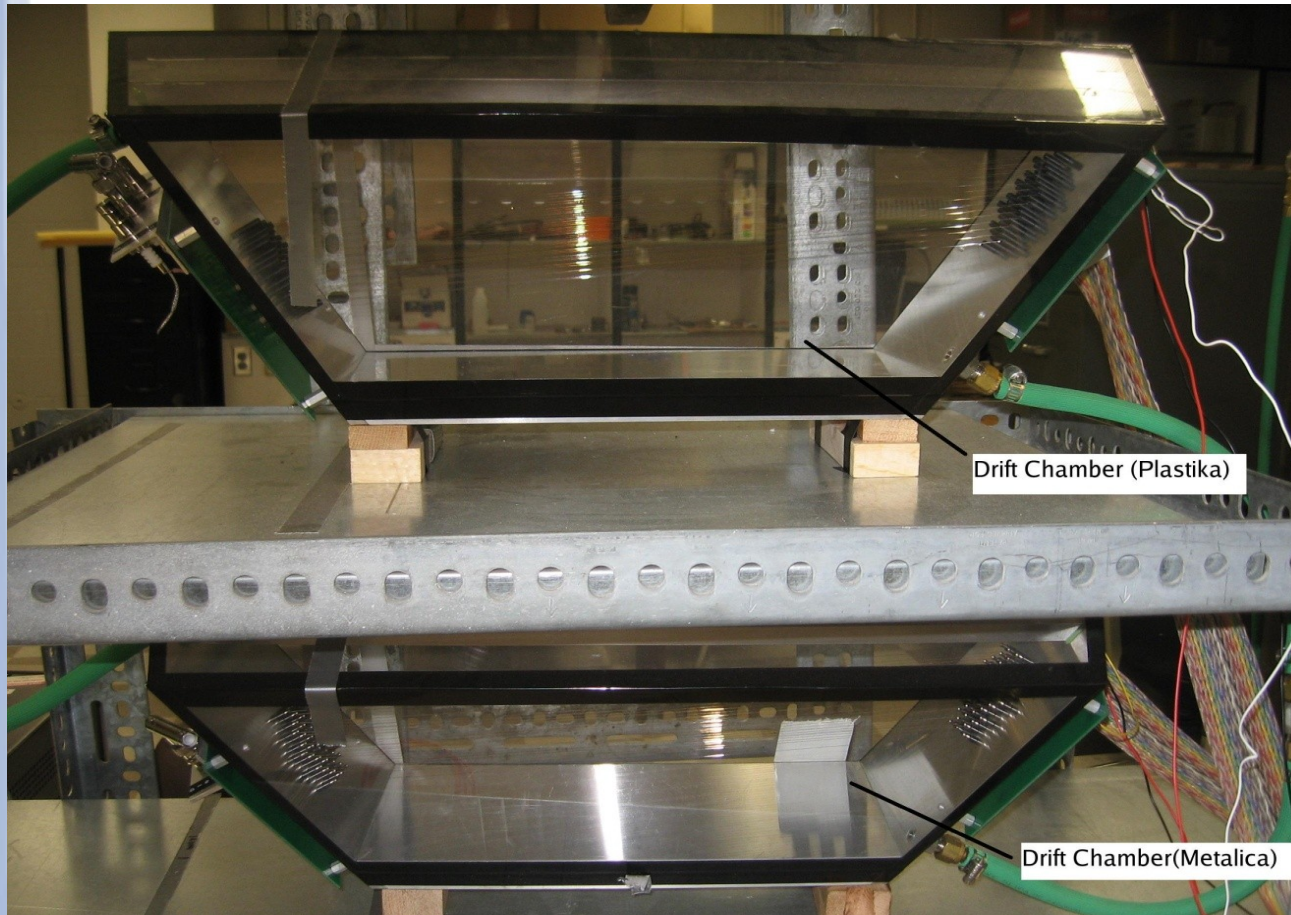


gas-filled tube

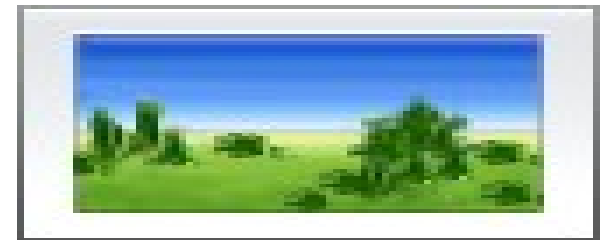
electrically charged wire

charge cloud

# Experimental Setup In LDS

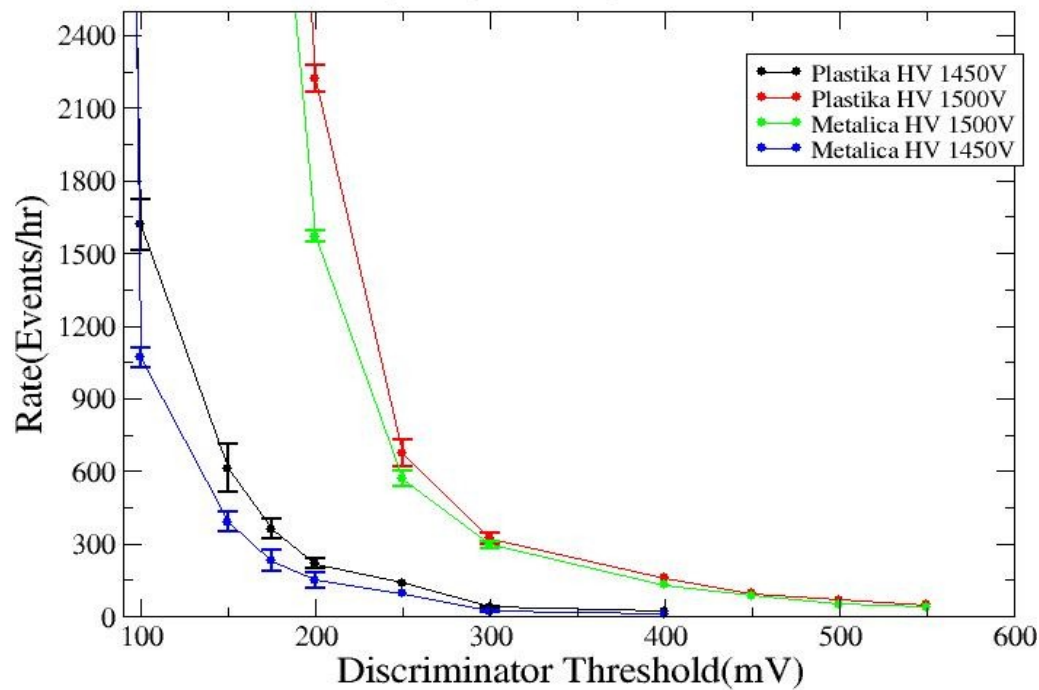


- Drift Chambers were stacked on top of each other
- High voltage and ionization gas ( $\text{ArCO}_2$ , 90/10) were connected in parallel
- Drift Chambers were operated at different high voltages
- Sense wire 4 was used to obtain results

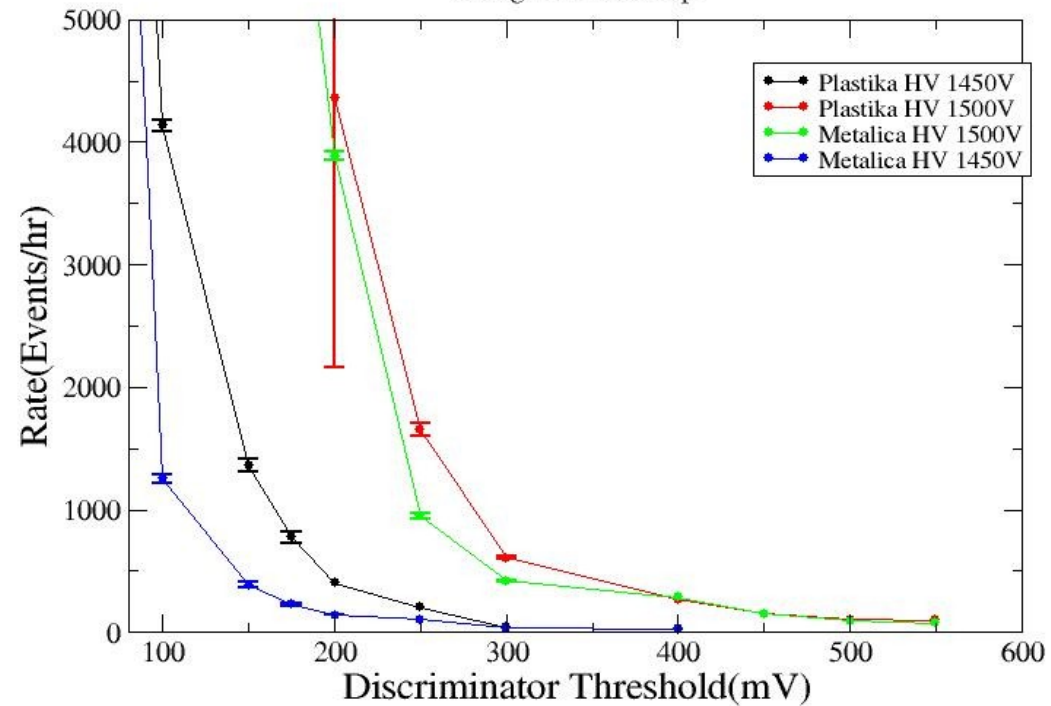


# Noise Measurements Using Single Cosmic Events

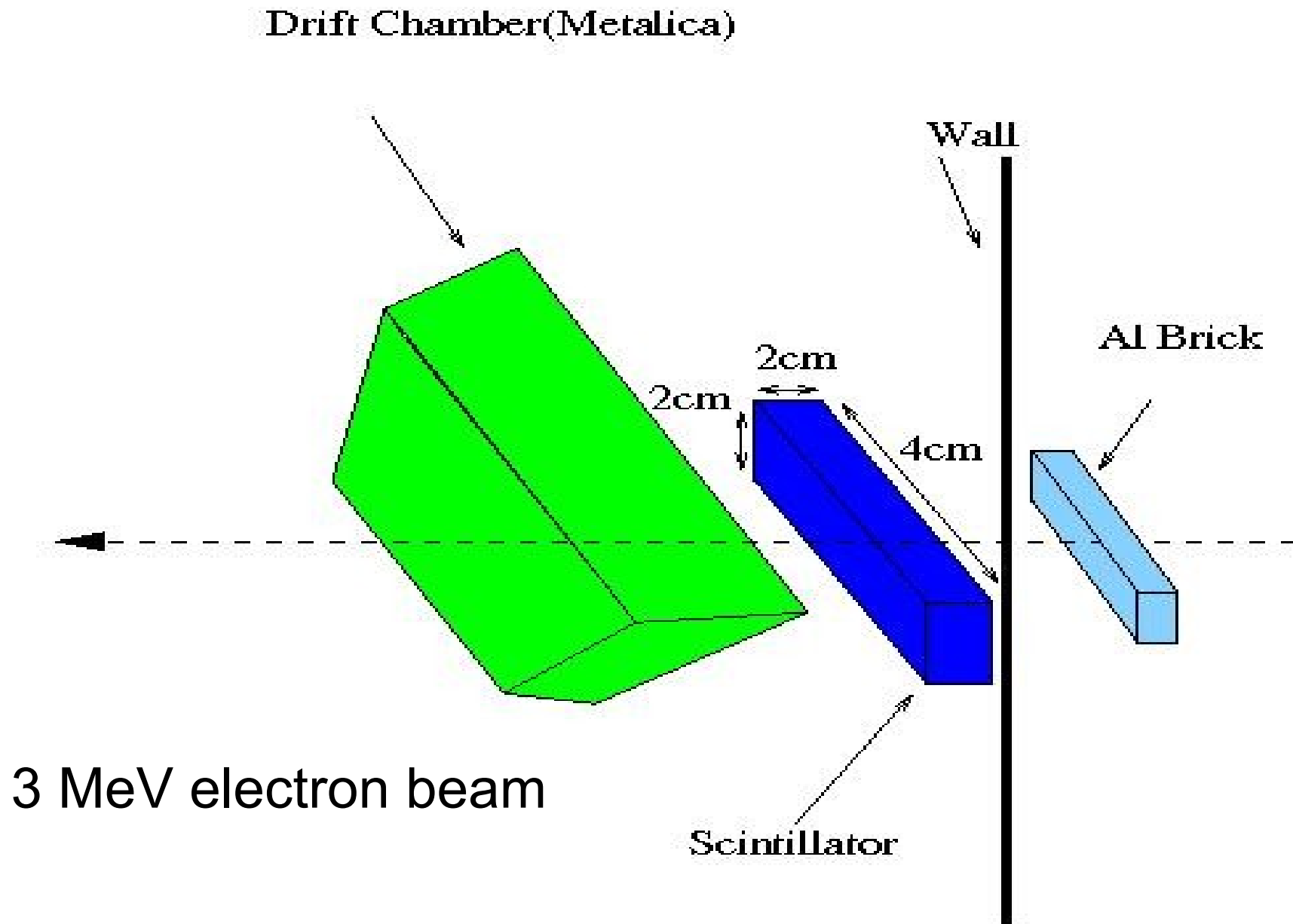
Discriminator Threshold vs Rate for DC  
Using Phillips Gain Amplifier Model 777



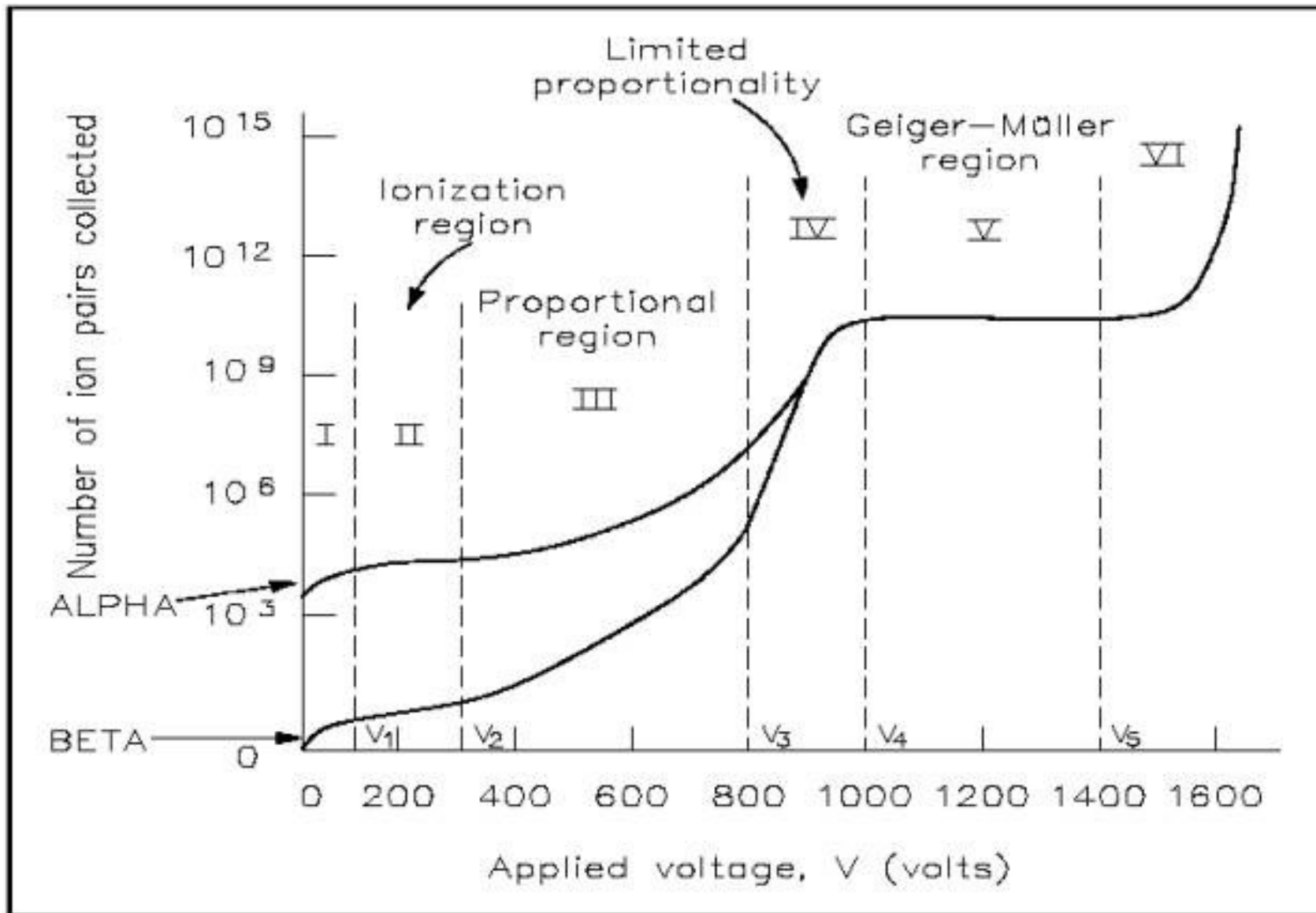
Discriminator Threshold vs Rate for DC  
Using VPI PostAmp



# Experimental Setup in HRRL

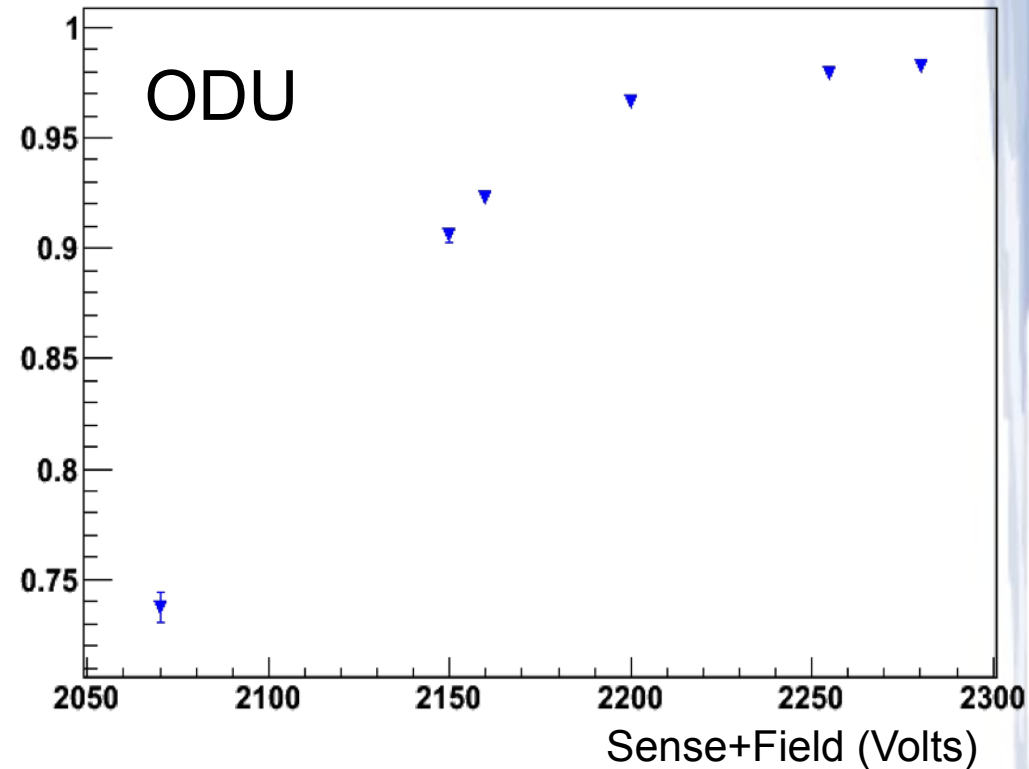
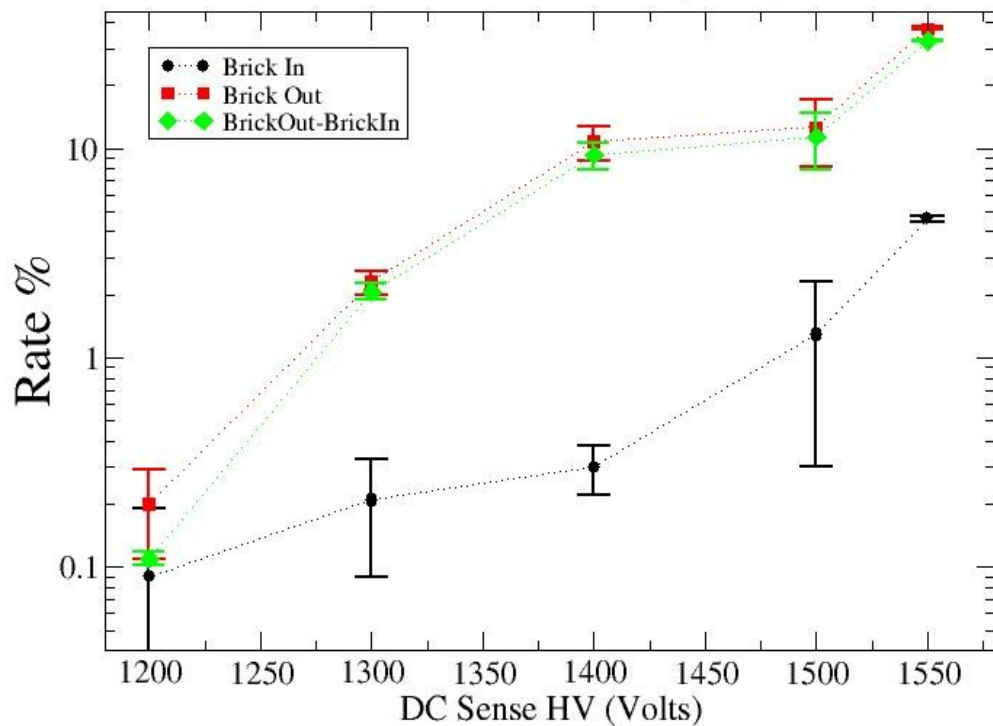


# HV Plateau



# Drift Chamber HV Plateau Measurement At ISU vs ODU

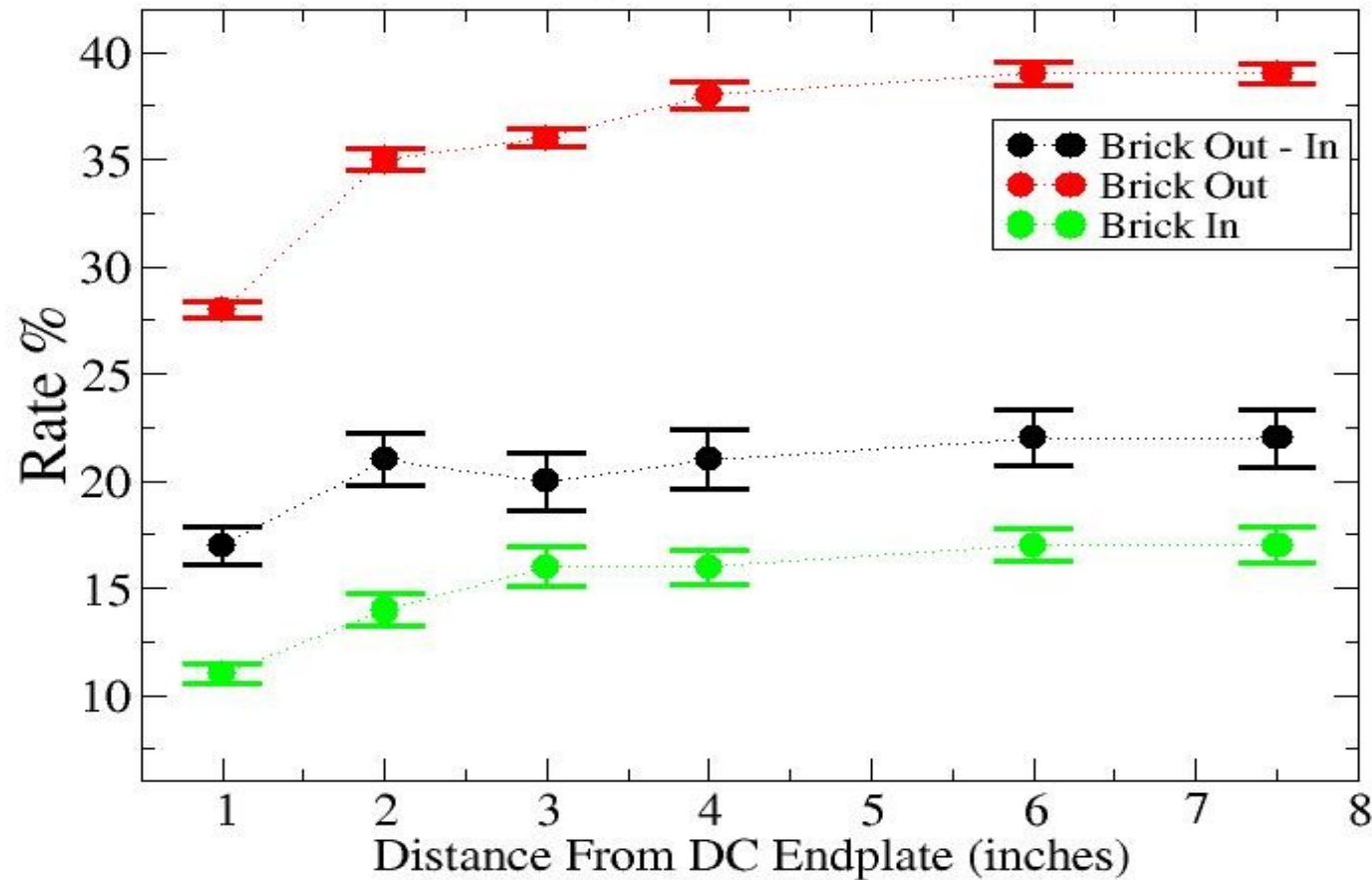
Drift Chamber Sense HV vs Rate  
BrickIn, BrickOut & Brick(Out-In)



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

# 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