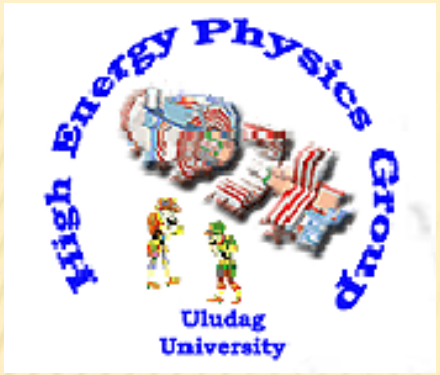
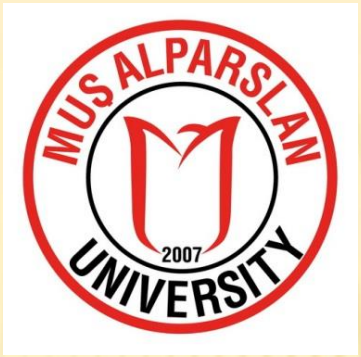




Anew Story of Ions for MPGD's

- ✓Ions effects on signal
- ✓Future plans

22/24-04-2013, RD51 miniweek

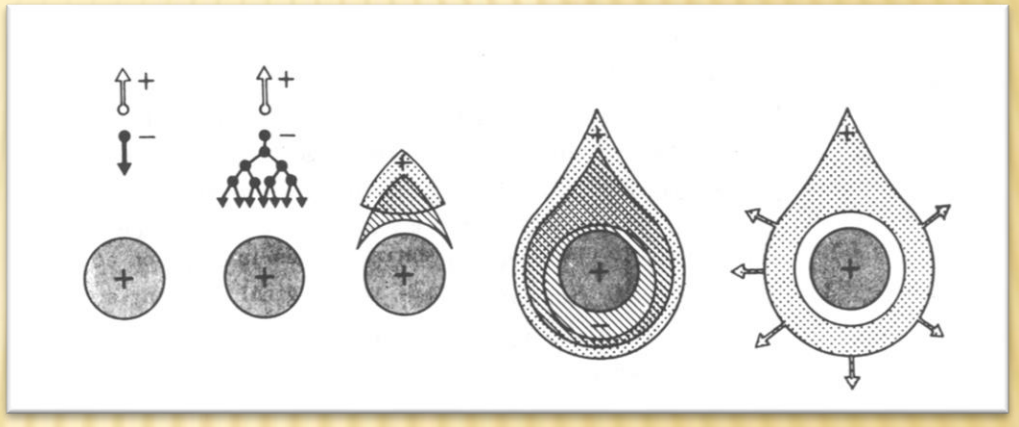
Yalçın KALKAN
Physics Department of Uludag University
Bursa -TURKEY

Ions effect of signal

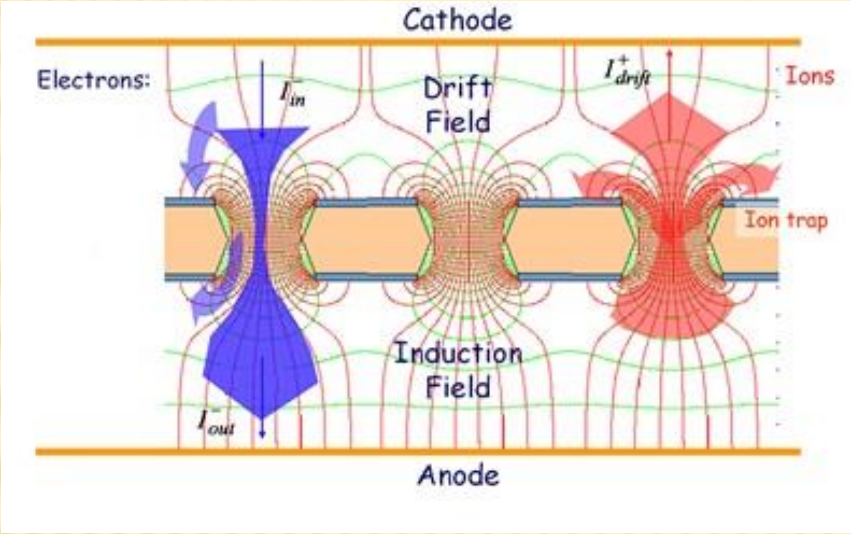
$$e.\Delta U = V_0.\Delta Q$$

$$i = \frac{\Delta Q}{\Delta t} = \frac{\Delta Q}{\Delta r}\frac{\Delta r}{\Delta t}\mu$$

$$= \frac{e.\Delta U}{V_0.\Delta r}\mu$$

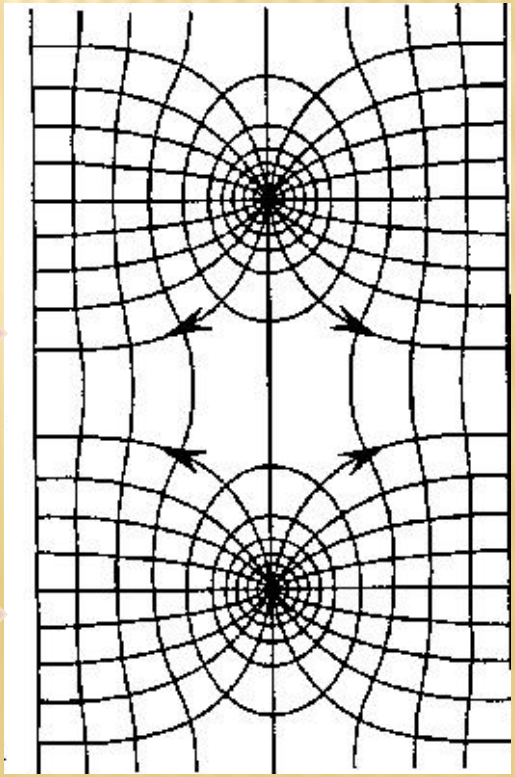


Relation between Mobilities and Electrical Field



Ordinary electrical Field $\mu_- \gg \mu_+$

Very high electrical Field $\mu_- > \mu_+$



Relation between induced charge and time

$$\mu_{Ar^+} = 1.3\ cm^2\ sec^{-1}\mathrm{V}$$

$$\beta = \frac{2q\pi^2\mu}{s^2}$$

$$\mathrm{Q(t)} = \frac{q}{V_0} e\left[ln\left\{e^{2\beta(t+t_0)} - 1\right\} - ln\left(e^{2\beta(t_0)} - 1\right)\right]$$

$$\mathrm{V_0} = 3000\mathrm{V}$$

$$t_0 = \frac{1}{\beta} ln \cosh \frac{\pi d}{2s}$$

$$s = 2mm$$

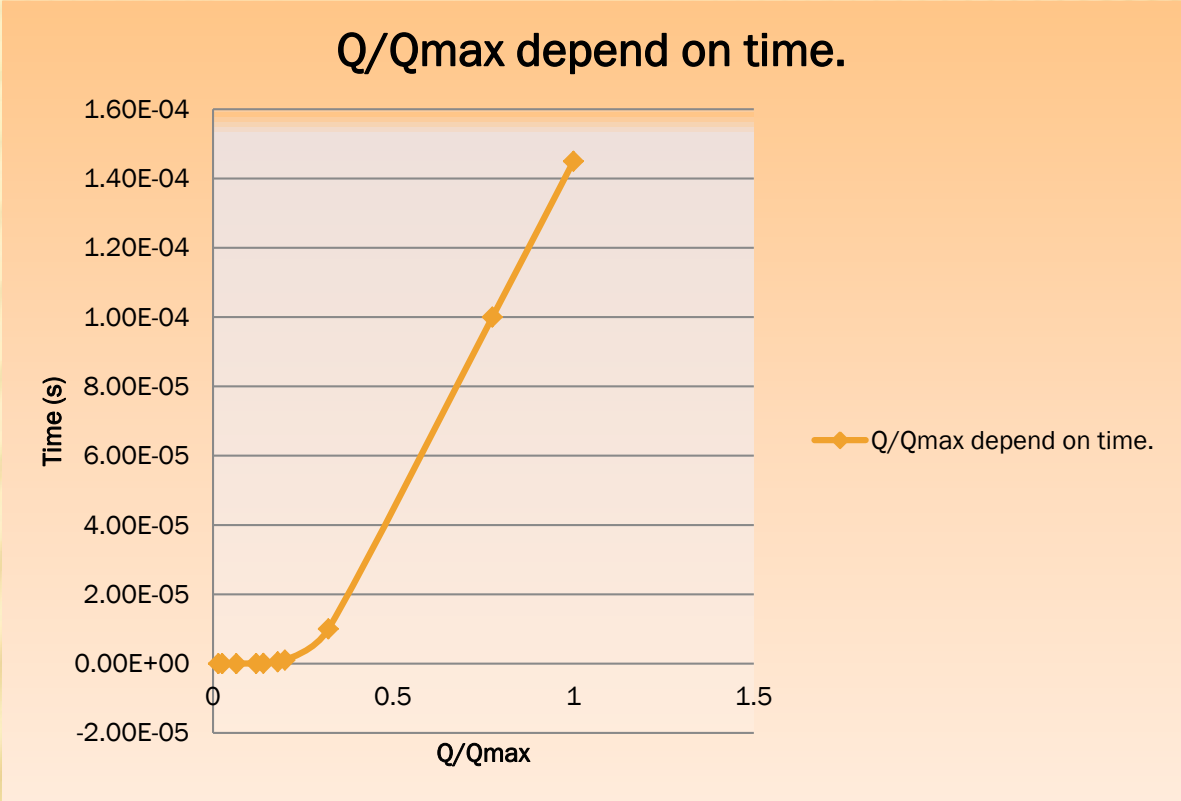
$$\mathrm{t}_{max} = 145\ \mu\mathrm{sec}$$

$$\mathrm{t_0} = 1.8\ \mathrm{nsec}$$

$$\beta = 7 \quad \mu\mathrm{sec}$$

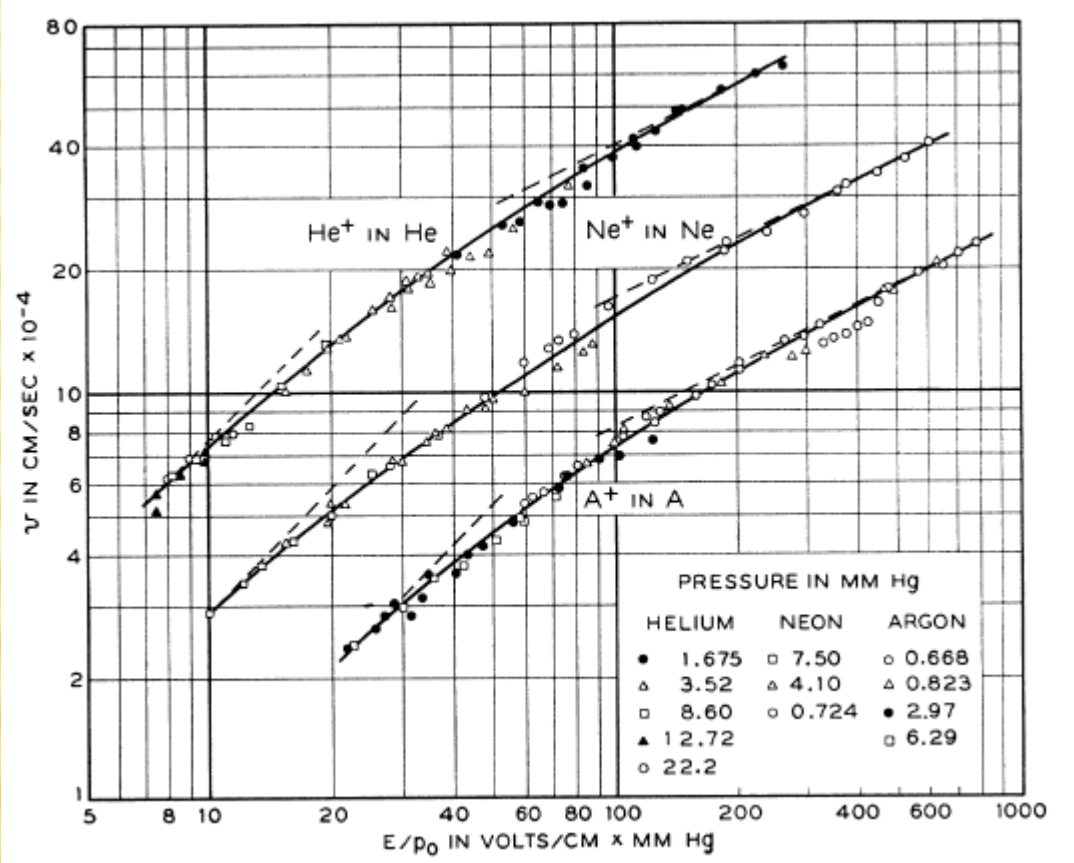
$$\mathrm{Q(t)} = \frac{q.e}{V_0} ln \frac{t + t_0}{t_0}$$

Relation between induced charge and time



Were obtained from D. Rahm, Brookhaven National Laboratory..

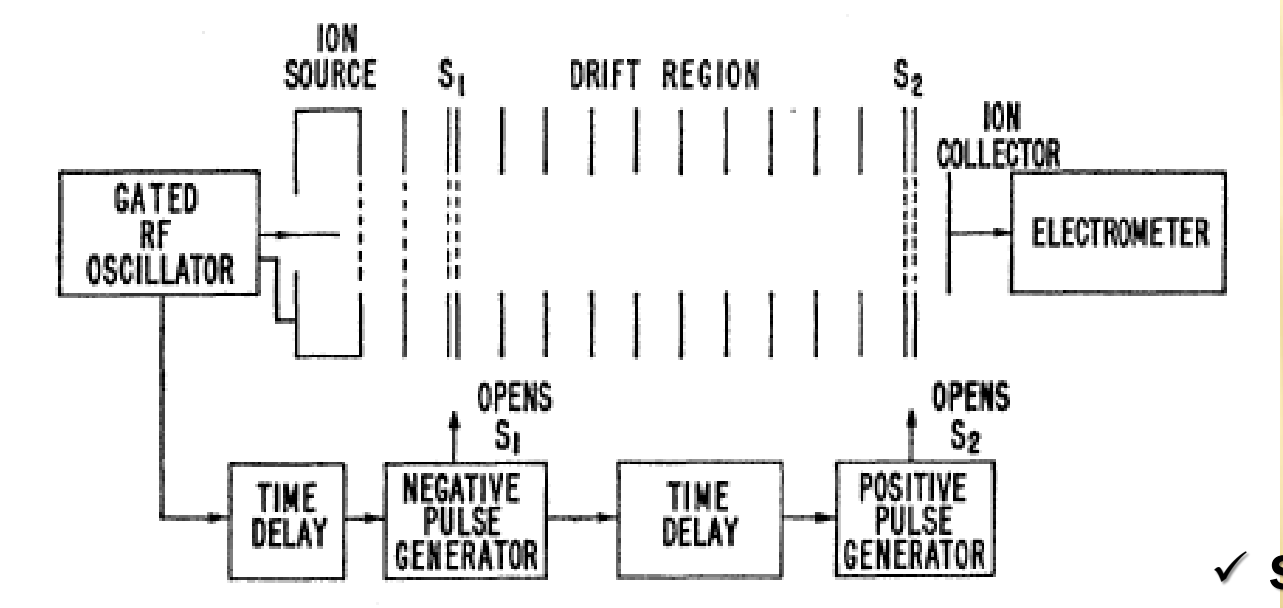
Relation between drift velocity and current



- ✓ **Log-log scale**
- ✓ **p_0=273p/T**
- ✓ **The broken lines at the right have slope = 1/2,indicating $v \sim (E/po)^{1/2}$**
- ✓ **The broken lines at the left of each experimental curve have slope = 1. $v \sim (E/po)^{1/2}$**

* JoHN A. HORNBECK. BeLL Telephone Laboratories, Murray HiLL, New Jersey (August , 1951)

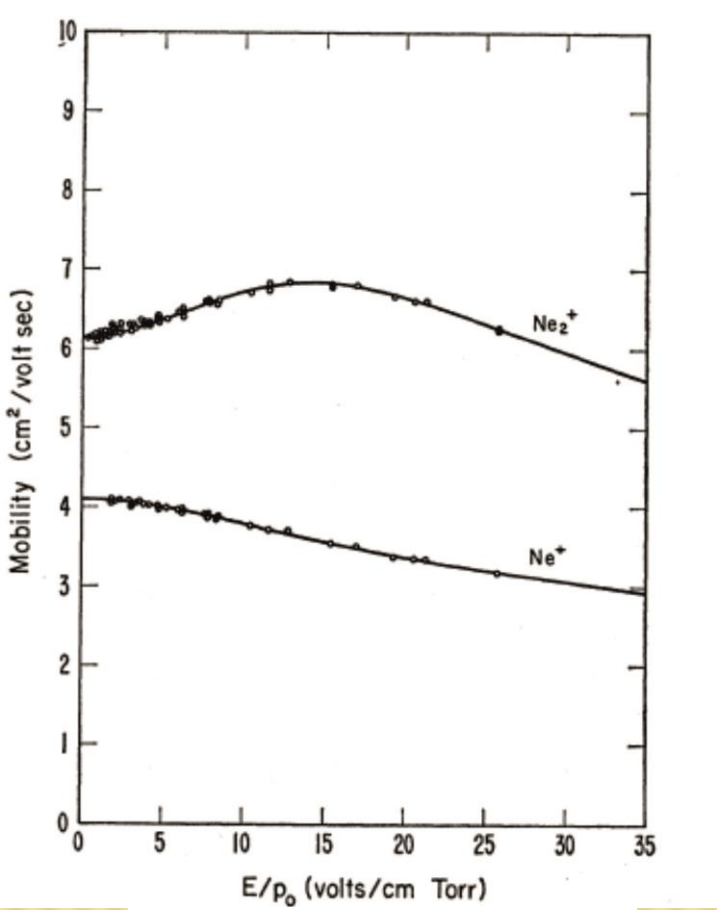
Experimental methods for mobility measurements



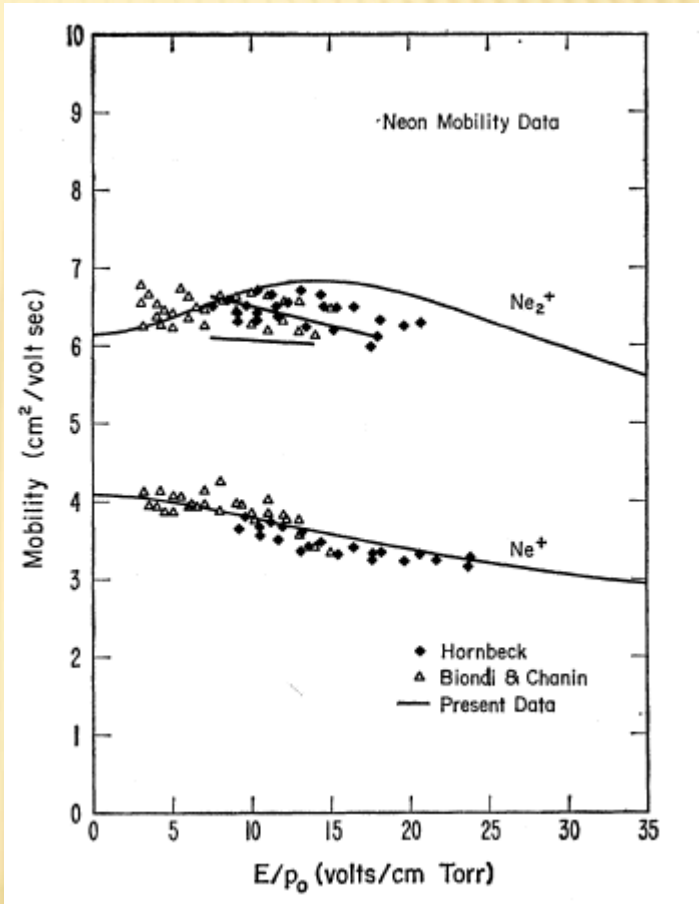
- ✓ **Schematic illustration of the experimental apparatus.**
- ✓ **S_1 and S_2 are electrical shutters.**

* E.C. BEATY and P.L. PATTERSON. Joint Institute for Laboratory Astrophysics, Boulder, Colorado (January, 1968)

Experimental results for mobility measurements

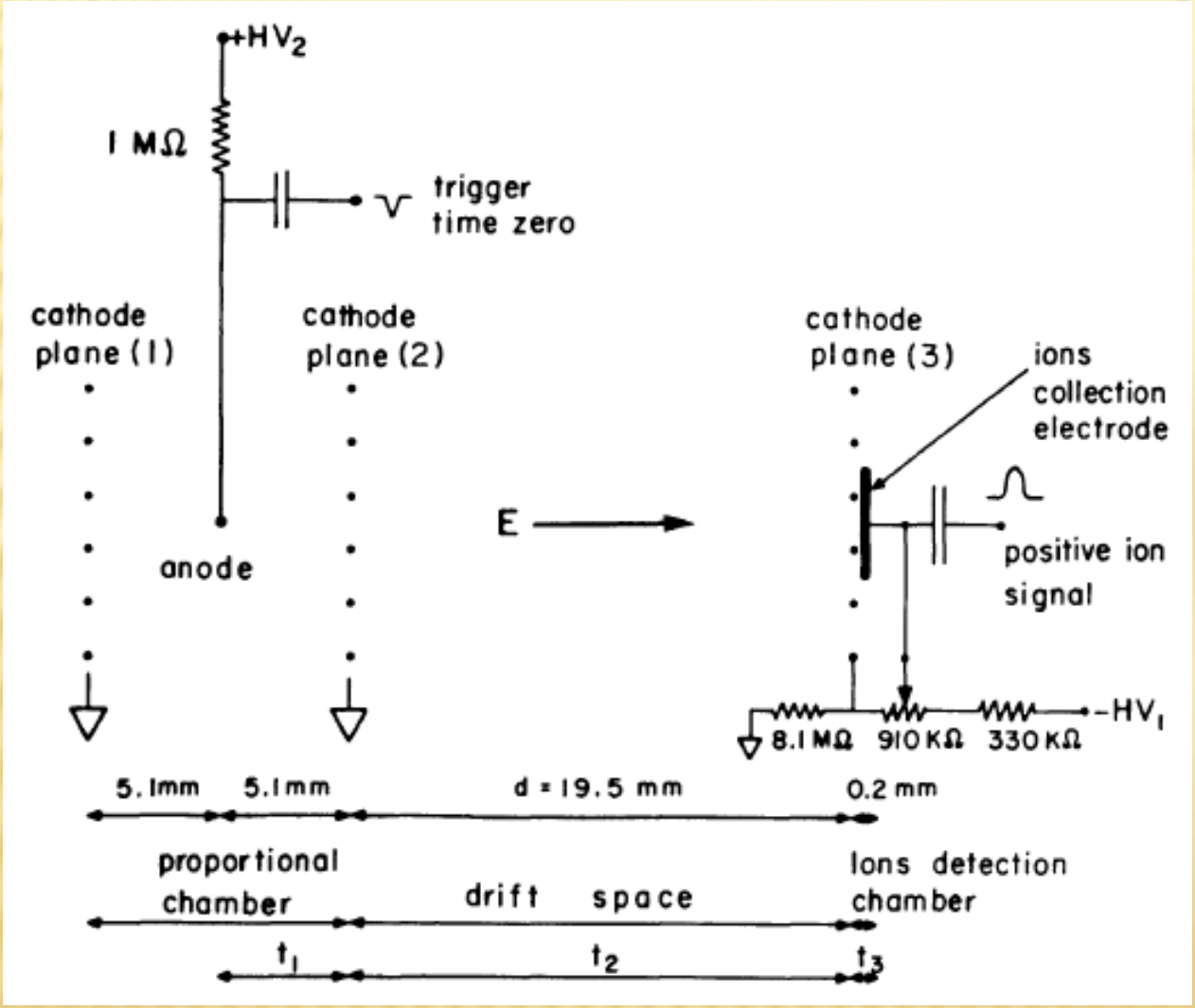


$$K = K_0/[1+a_1(E/p_0)^2+a_2(E/p_0)^4]^{-1/8}.$$



* E.C. BEATY and P.L. PATTERSON. Joint Institute for Laboratory Astrophysics, Boulder, Colorado (January, 1968)

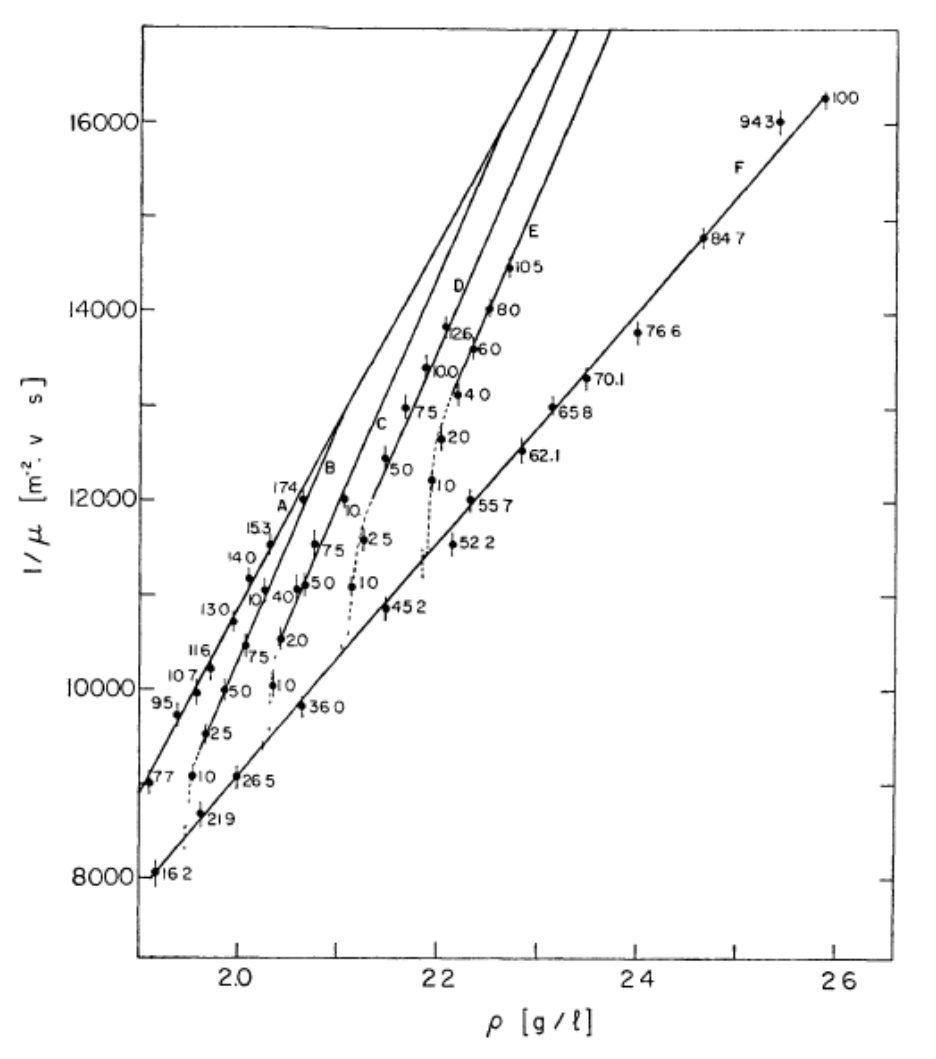
Experimental methods for mobility measurements



$$\checkmark \mu = \frac{d}{t_2 E}$$

G. Schultz . Centre de Recherches Nucléaires (Laboratoire PNPP-HE) Strasbourg, France(June, 1968)

Experimental results for mobility measurements

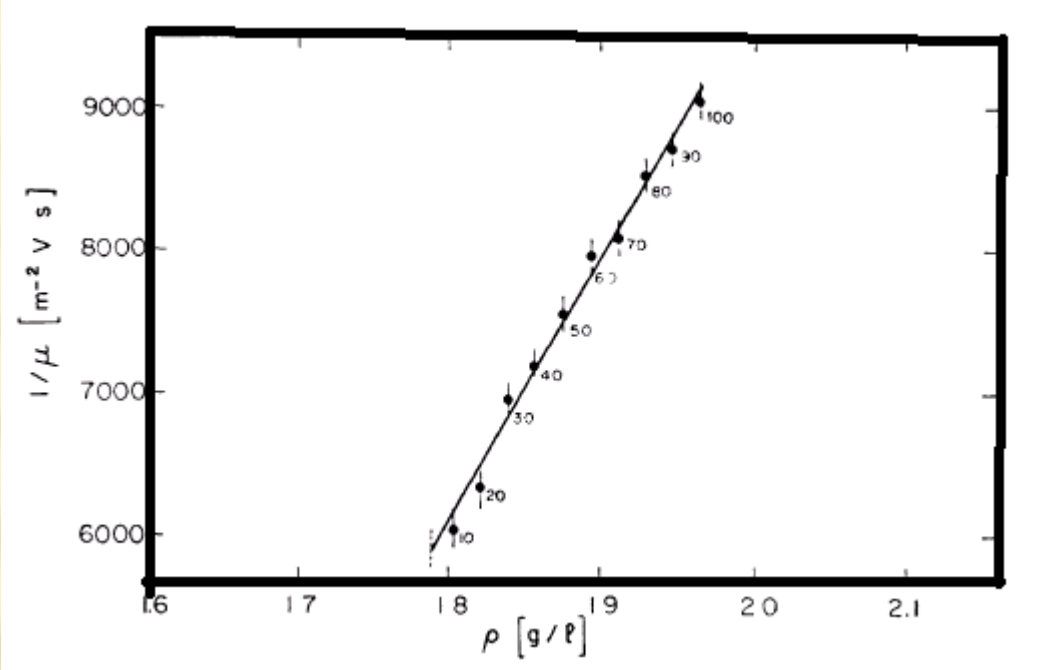


Curve A : argonmethylal
Curve B : argon 80 %-isobutane-methylal
Curve C :argon 70 %-isobutane-methylal
Curve D : argon 60 %-isobutane-methylal
Curve E : argon 50 %-isobutane-methylal

Blanc's law is fully confirmed except for low methylal contents ;
Curve F : argon-isobutane.

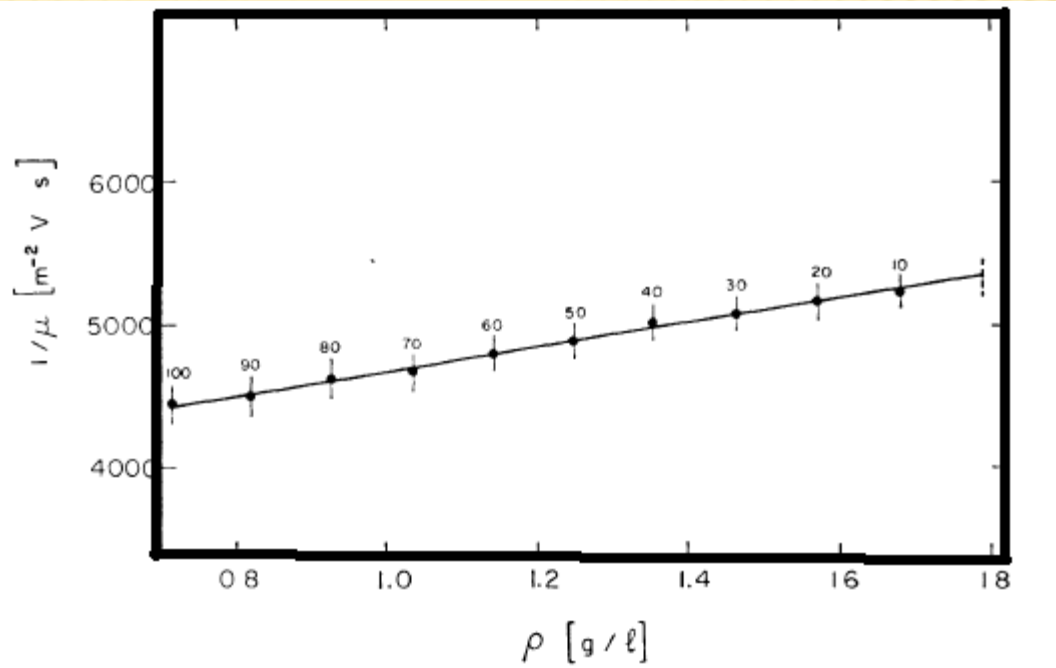
G. Schultz . Centre de Recherches Nucléaires (Laboratoire PNPP-HE) Strasbourg, France(June, 1968)

Experimental results for mobility measurements



G. Schultz . Centre de Recherches Nucléaires (Laboratoire PNPP-HE) Strasbourg, France(June, 1968)

Experimental results for mobility measurements



G. Schultz . Centre de Recherches Nucléaires (Laboratoire PNPP-HE) Strasbourg, France(June, 1968)

Resuls for now

- ✓ The ions are responsible for the signal as seen in Micromegas and GEMs as well as all wire chambers . It is not in dobt.
- ✓ We needed new measurement of mobility of atomic and molecular ions in gas mixtures for information.

Planning

- ✓ We will try to this measurement in Turkey, if possible. İf not, look for another enstitue at different country
- ✓ Using this measurement , we can know what is the effect of ions in our detectors.

Thanks…