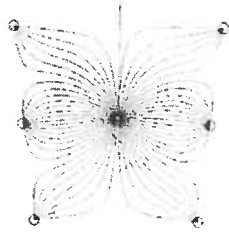
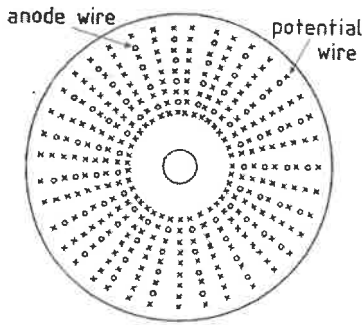


MIS, 18.3.2026 ①

DRIFT (POTENCIJALNA) KODORA - NABALTOVANJE

NA TRKAZNIKOH . OBICAJNO CILINDRICNE OBLIKE



KRIVULTE SILNICE

Z MAJHNIMI (NEKAJ CM),
PRIBLIŽNO KVADRATNIMI
OBLICAMI

NA SREDINI ANODNA ŽICA
NA ROBNIH KATODE -
- OBLIKOVANJE POLJA

TAKONA KONFIGURACIJA JE
UGODNA, KER MINIMIZIRA
MATERIAL - VEČERATNO SI PANEJE!
[PAZITI PA JE TREBA TUD NA PLIN]

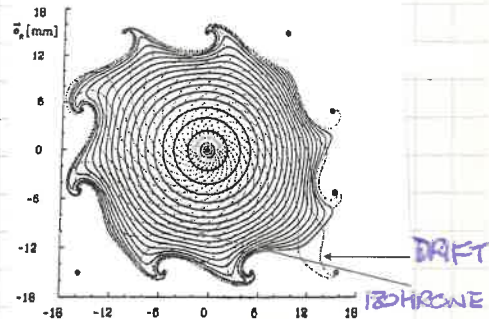
DRIFT KODORA U MAGNETNEM POLJU

CE $\vec{E} \perp \vec{B}$ - OBICAJNO \vec{B} UZDOLŽ OSI KODORE, $\vec{E} \perp$
→ ELEKTRONI PRI DRIFTU ZAVIJATO → NETO EFFECT
DRIFT POD KOTOM GLEDE NA \vec{E}

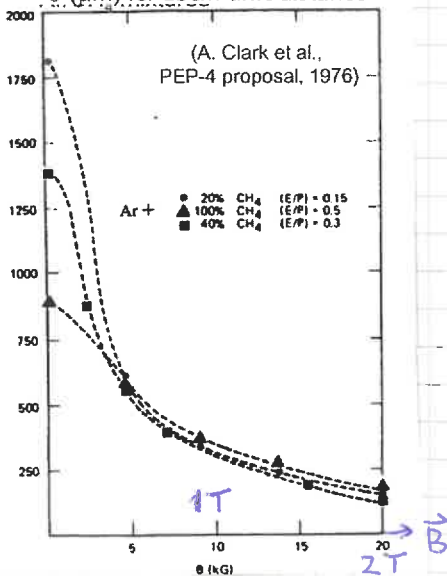
$$\tan \alpha = \omega \tau$$

ω = CIKLOTRONSKA
FREKVENCA $\omega = \frac{eB}{m}$
 τ : DOPIR, ČAS MED
TRKI

VLINA NA REAKCIJO $X = X(\frac{1}{D}) \rightarrow$
→ KALIBRACIJA



σ (μm) for 15cm drift distance

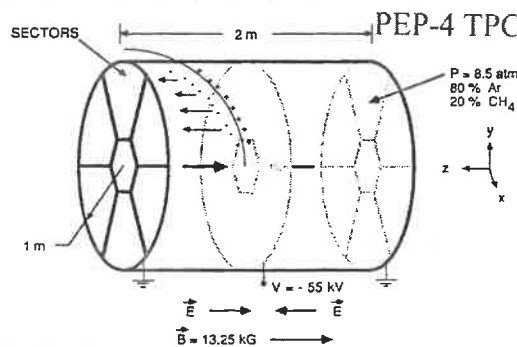


KAJ PA, CE STA $\vec{E} \parallel \vec{B}$?

DRIFT UZPOKOJNO Z \vec{E} , TUDA DIFUZIJA SE
V SMERI PRAVOKOTNO DRAMATICNO ZVLAJISA!

TO ZVORISKANO U TPC

- TIME PROTECTION CHAMBER



ELEKTRONI DRIFTATO
U SMERI Z, NA KONCU
VALJA Z-D DETEKTOR -
TRICHO VZPK S
KVADRATNIMI KATODNIMI
SEKMENTI.

Gas mixtures for drift chambers and MWPCs

Main component: a gas with a **low** average ionisation energy W_i - **nobel gases** have less degrees of freedom.

Add to this:

- A component which **absorbs photons** ('quencher') produced in the avalanche (deexcitation of atoms and ions) – an organic molecule with a lot of degrees of freedom: isobutane, methane, CO_2 , ethane
- A component which **prevents** that ionized organic molecules would travel to the cathode, stop there, and **polymerize** to form poorly conductive layers: a gas which has a low ionisation energy - methylal
- A small concentration of an **electronegative gas** (freon, ethylbromide) which prevents the electrons travel too far (to prevent that electrons which escaped from the cathode start **new avalanches**) allows to work at high gains (10^7)

'Magic mixture': 72% Ar, 23.5% isobutane, 4% methylal, 0.5% freon

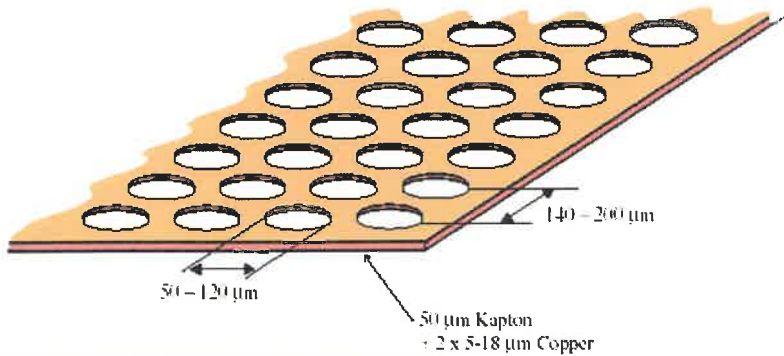
P. Križan, Ionisation counters

Gas mixtures for drift chambers and MWPCs 2

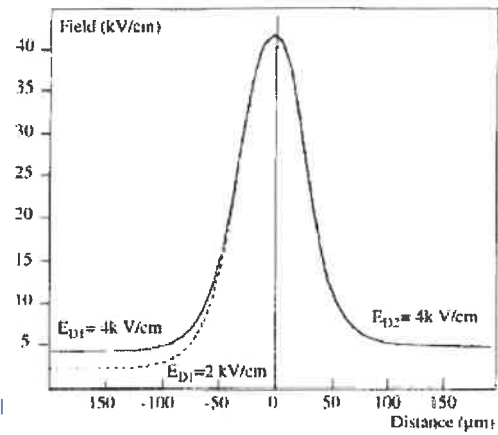
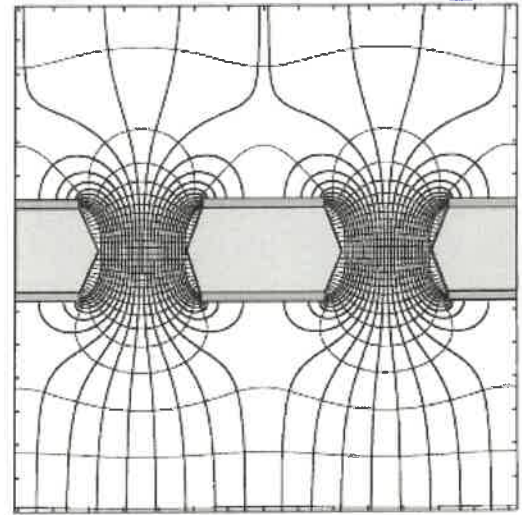
For drift chambers in addition:

- Need a gas with **constant drift velocity** (to simplify the drift time -> distance relation)
- Sometime **low density** (to reduce **multiple scattering**): add He
- **Long drift distances**: **no electronegative gas**
- Gas with a **small diffusion coefficient** ('cool' gas): CO_2 , DME
- To prevent anode wire **ageing** (a poorly conductive layer on the anode – redices gain): add very little **water** or freon CF_4 .

GEM (gas electron multiplier) preamplification



The E field in the holes is non-uniform – large enough to get gas amplification of about 100: useful as a preamplification stage for MSGCs.

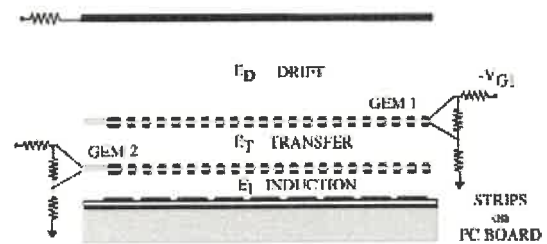


P. Križan, Ionisation counter

2x GEM + cathode pads

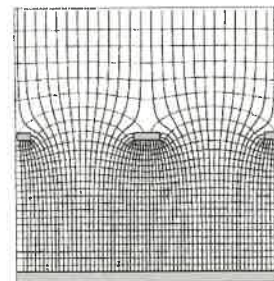
Two amplification stages in gas: 2xGEM, cathode with pads for read-out.

Very simple production!



MICROME GAS

Instead of the GEM foil use a mesh of thin wires. The effect is similar.



2x GEM + MICROME GAS

Probably the most popular combination at present.