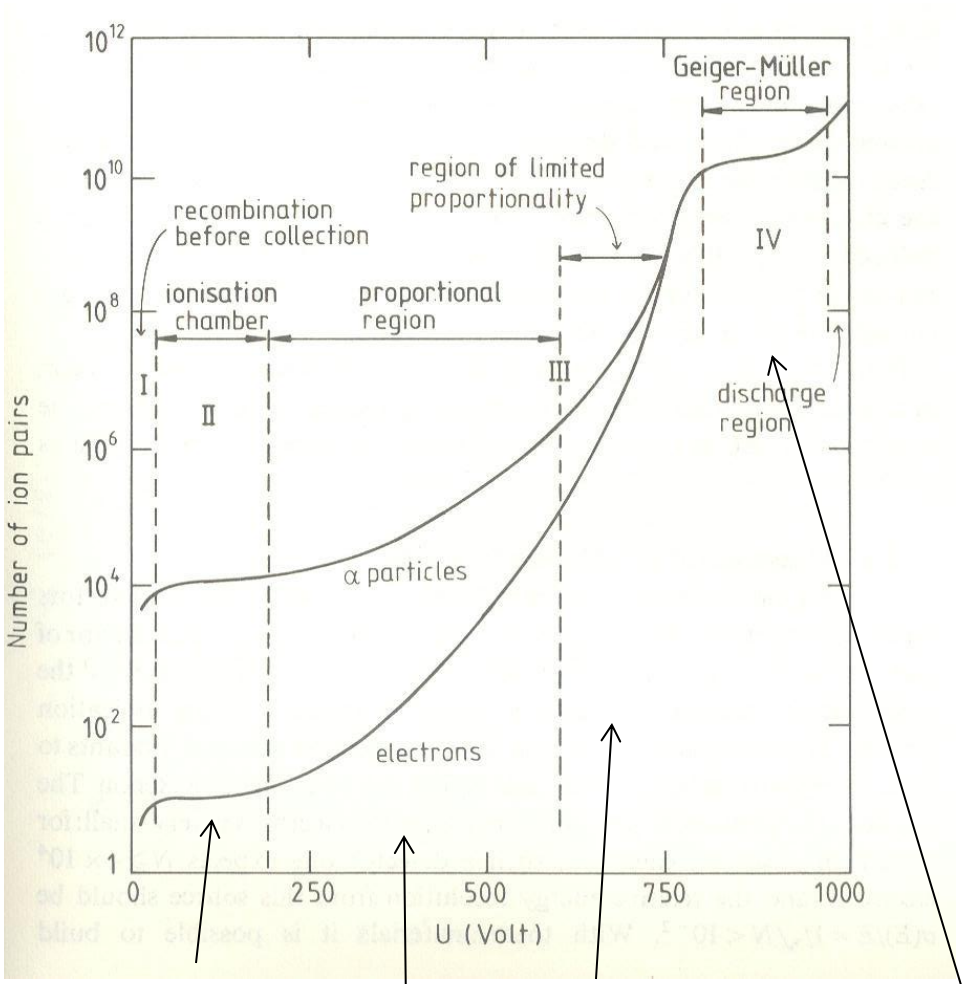
Plinasti detektorji

K. Kleinknecht, Detectors for Particle Radiation

režimi delovanja:



ionizacijske celice

proporcionalni števci

območje omejene proporcionalnosti

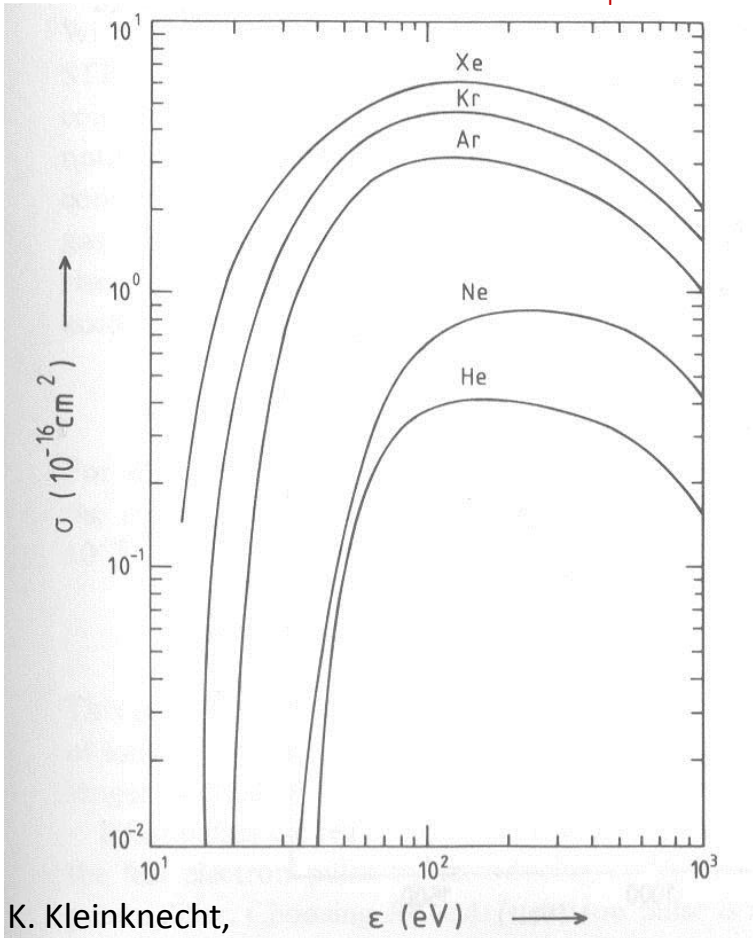
Geiger-Müllerjevi števci

Plinasti detektorji

presek za ionizacijo z e^-:

Penningov efekt

$W_i^{Ar} < E^{*Ne} < W_i^{Ne}$



K. Kleinknecht,
Detectors for Particle Radiation

W.R. Leo, Techniques for Nucl. and Part. Phys. Exp.

Table 6.1. Excitation and ionization characteristics of various gases

	Excitation potential [eV]	Ionization potential [eV]	Mean energy for ion-electron pair creation [eV]
H_2	10.8	15.4	37
He	19.8	24.6	41
N_2	8.1	15.5	35
O_2	7.9	12.2	31
Ne	16.6	21.6	36
Ar	11.6	15.8	26
Kr	10.0	14.0	24
Xe	8.4	12.1	22
CO_2	10.0	13.7	33
CH_4		13.1	28
C_4H_{10}		10.8	23

w ~30 eV

Table 6.2. Measured Fano factors for various gas mixtures

Gas	F	Ref.
Ar 100%	$0.2^{+0.01}_{-0.02}$	[6.4]
	$<0.40 \pm 0.03$	[6.5]
Ar + 80% Xe	$<0.21 \pm 0.03$	[6.5]
Ar + 24% Xe	$<0.23 \pm 0.02$	[6.5]
Ar + 20% Xe	$<0.16 \pm 0.02$	[6.5]
Ar + 5% Xe	$<0.14 \pm 0.03$	[6.5]
Ar + 5% Kr	$<0.37 \pm 0.06$	[6.5]
Ar + 20% Kr	$<0.12 \pm 0.02$	[6.5]
Ar + 79% Kr	$<0.13 \pm 0.02$	[6.5]
Xe 100%	$<0.15 \pm 0.01$	[6.6]
	$<0.15 \pm 0.03$	[6.5]
Kr 100%	$<0.23 \pm 0.01$	[6.6]
	$<0.19 \pm 0.02$	[6.5]
Kr + 1.3% Xe	$<0.19 \pm 0.01$	[6.6]
Kr + 20% Xe	$<0.21 \pm 0.02$	[6.6]
Kr + 40% Xe	$<0.22 \pm 0.01$	[6.6]
Kr + 60% Xe	$<0.21 \pm 0.01$	[6.6]
Kr + 95% Xe	$<0.21 \pm 0.01$	[6.6]

Fano factor

$$\frac{\sigma_E}{E} = \sqrt{\frac{Fw}{E}}$$

št. ionskih parov na enoto dolžine poti:

$$\alpha = N\sigma$$

N: atomska gostota, žlahtni plini pri normalnih pogojih $2{,}7 \times 10^{19}$ / cm^3

faktor pomnoževanja

P.J.B.M. Rachinas et al.,
IEEE Tran. Nucl. Sci. 43, 2399 (1996)

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