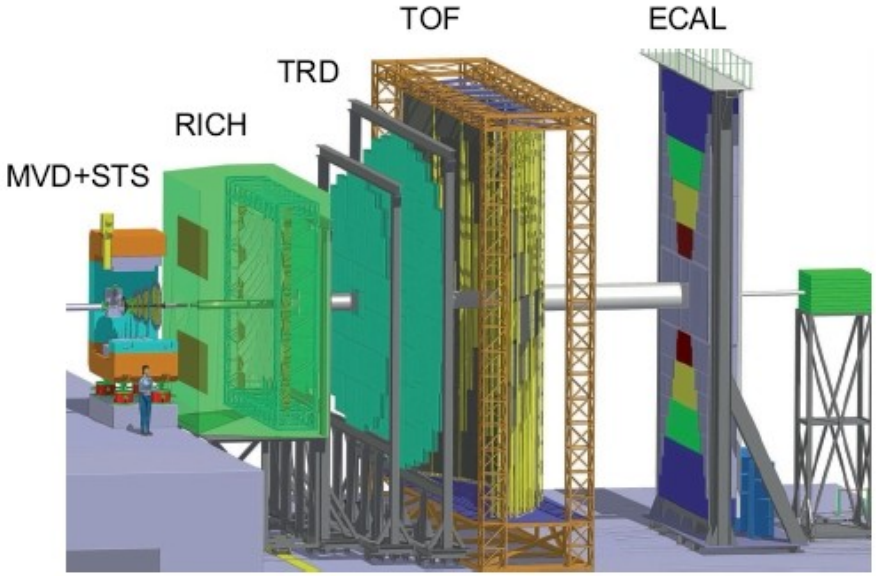
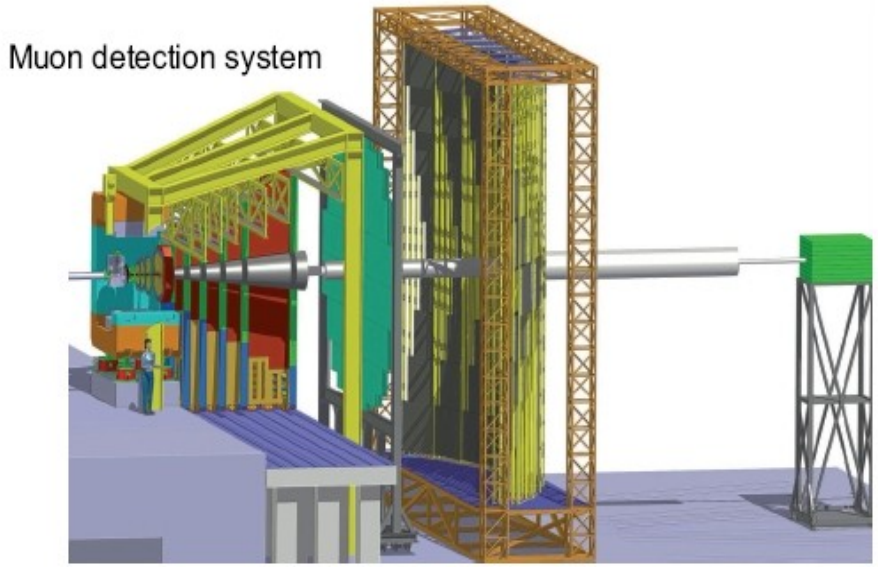
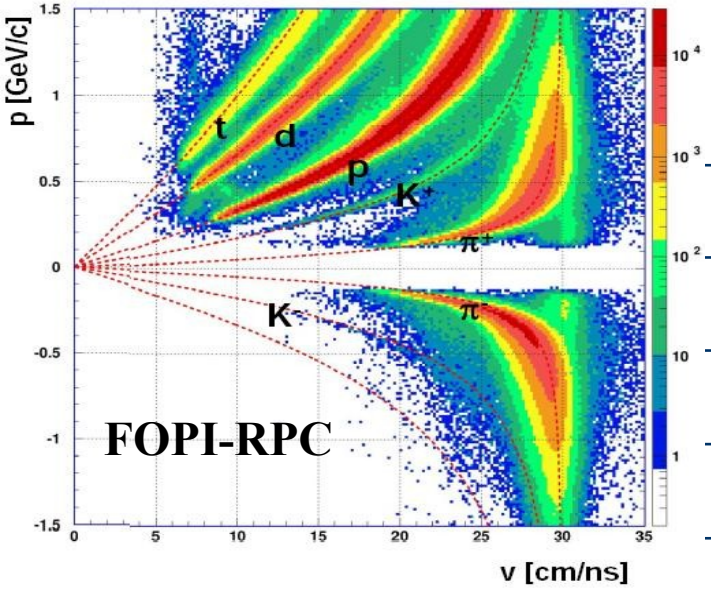
Testarea cu generator de impulsuri
si in conditii reale de lucru folosind surse radioactive
a noului CHIP TRD proiectat in cadrul grupului
pentru viitorul aranjament experimental CBM de la FAIR

CBM Experiment @ FAIR





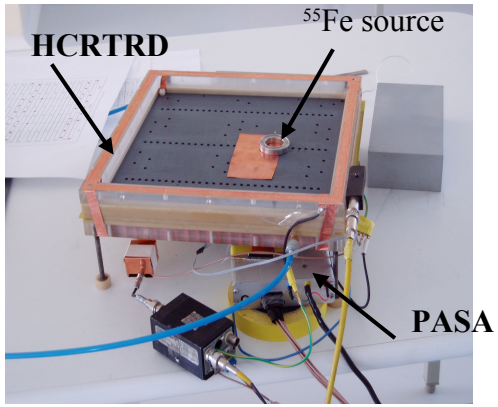
without ToF wall *with ToF wall*



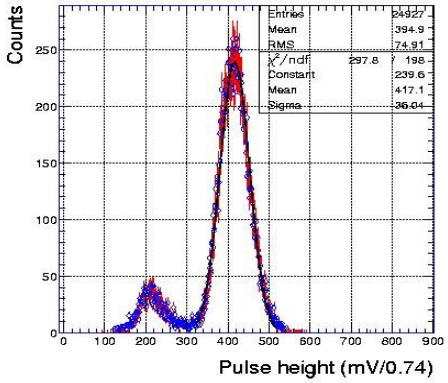
	S/B ratio	Efficiency %	S/B ratio	Efficiency %
ω	0.13	1.8	0.3	1.6
φ	0.05	3.8	0.11	3.5
η	0.002	0.9	0.008	0.8
ρ	0.001	1.6	0.005	1.4

A short reminder

85% Ar + 15% CO_2 ; HV 1700 V

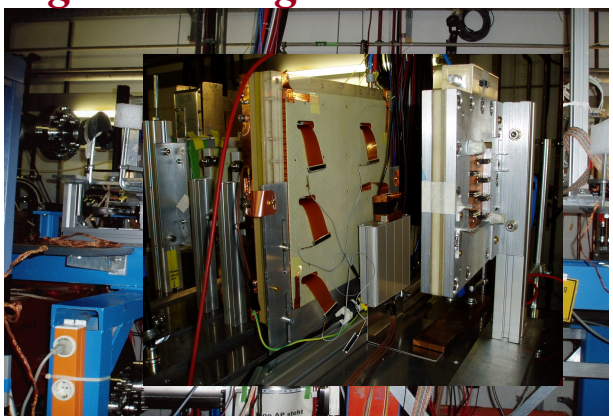


Readout: PASA (2mV/fC, 1800 e rms)
+ FADC Converter



Energy Resolution (pad signal):
~8.6 % (σ); ~20 % FWHM

Goal of the experiment: ***detector performance in high counting rate environment***

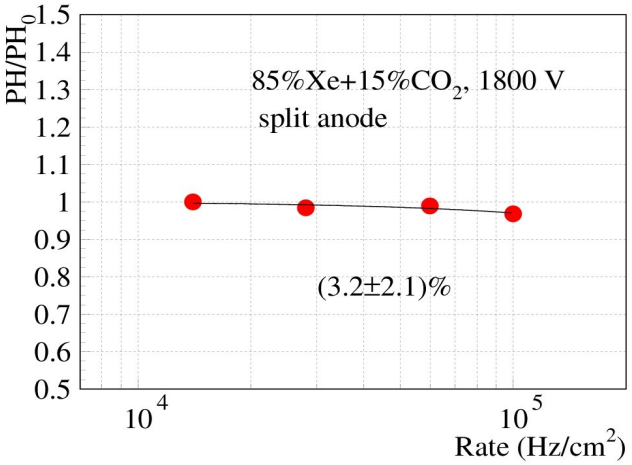


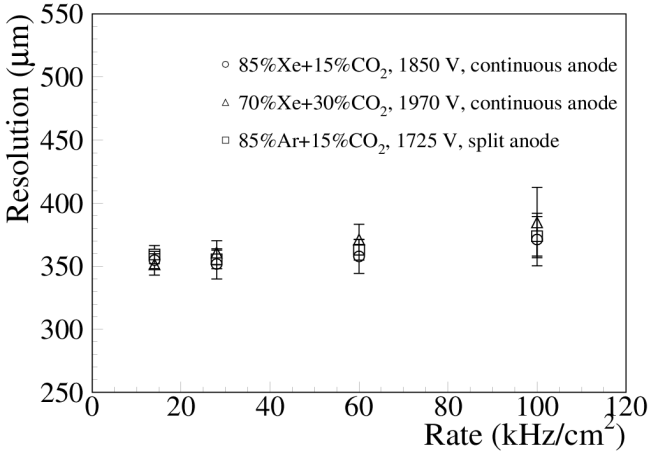
Experimental Setup

- 2 Scintillators (ToF, trigger)
- 2 Si -Strip Detectors (beam profile definition)
- 2 MWPC - GSI (10 x 10 cm²)
- 1 MWPC – NIPNE (24 x 24 cm²)
- 1 MWPC - JINR (10 x 10 cm²)
- 1 GEM – JINR
- Pb - glass calorimeter
- FADC readout ; DAQ (MBS)

A short reminder

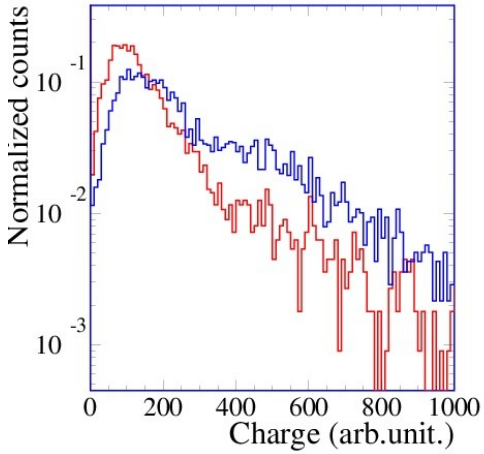
protons, p=2 GeV/c

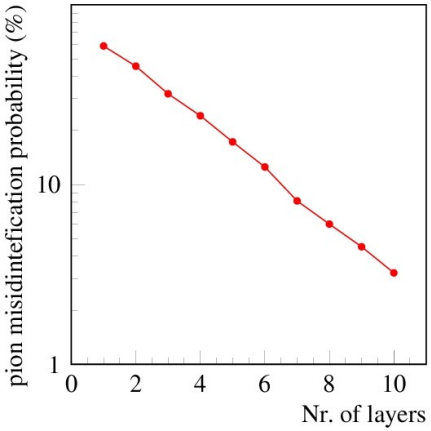




e/π discrimination

p=1GeV/c, U = 1900 V, Rohacell HF71 radiator,
Gas mixture: 85% Xe + 15% CO2

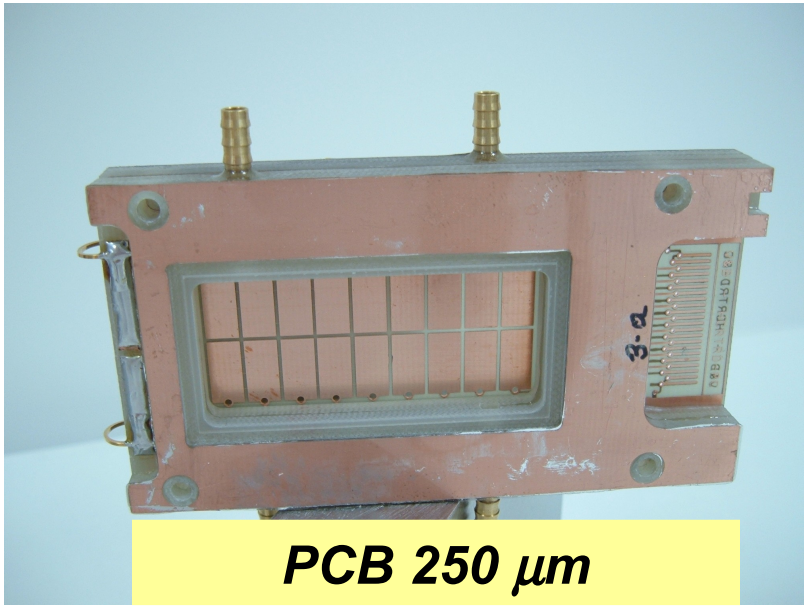




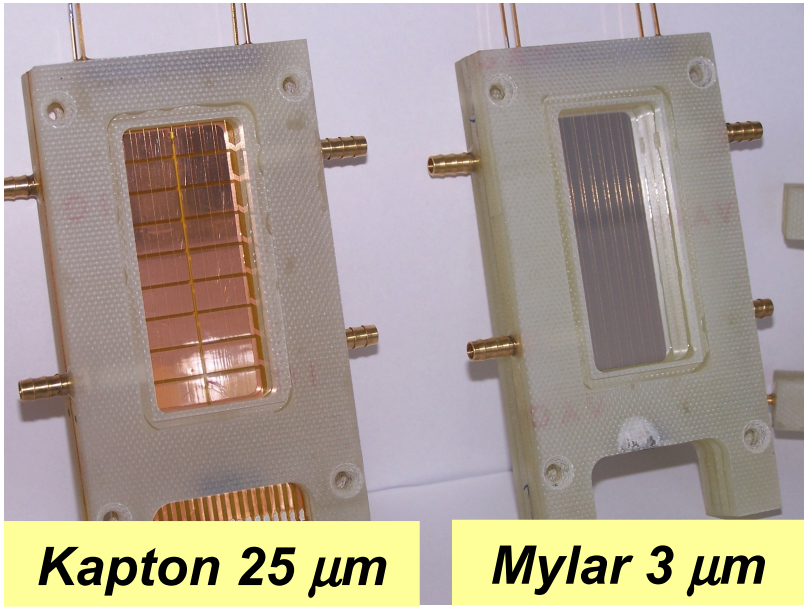
Pion efficiency:

- 6 layers configuration = 12.5 %
- 10 layers configuration = 2.9 %
- Can be improved using a better radiator from the point of view of the transition radiation yield

A short reminder

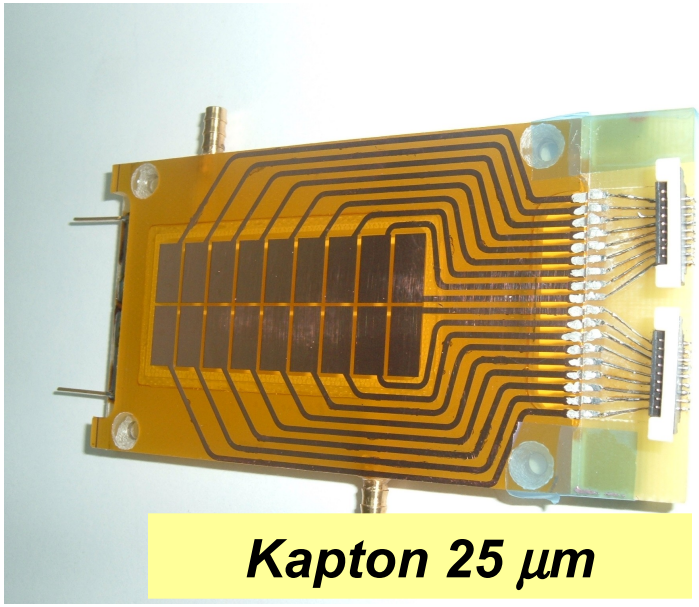


PCB 250 µm

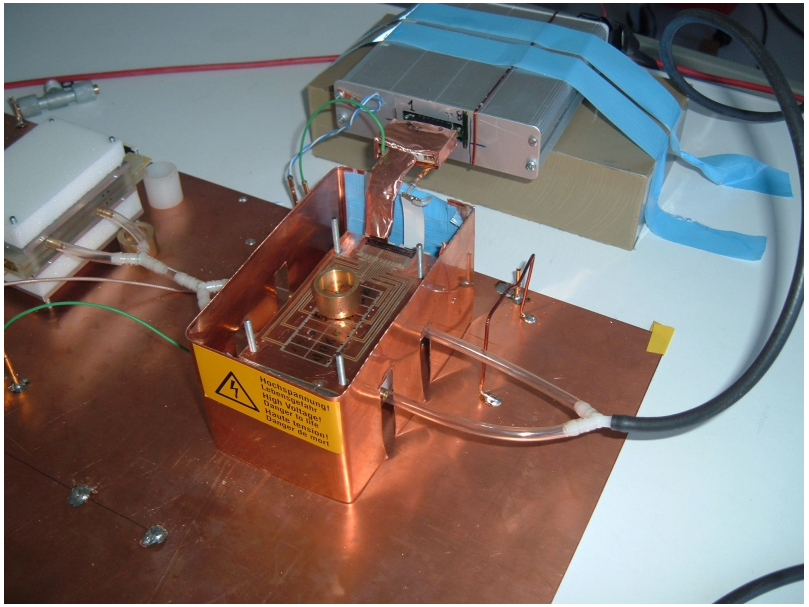


Kapton 25 µm

Mylar 3 µm

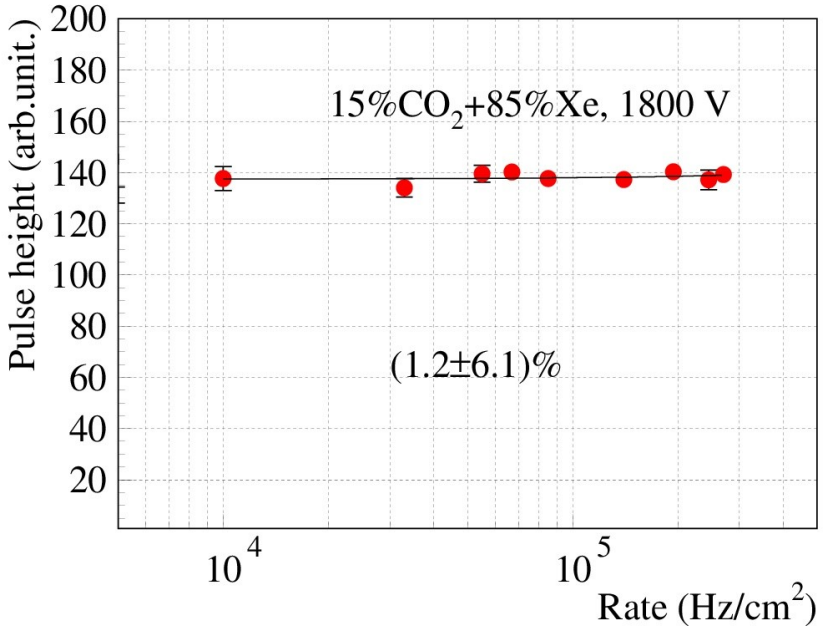


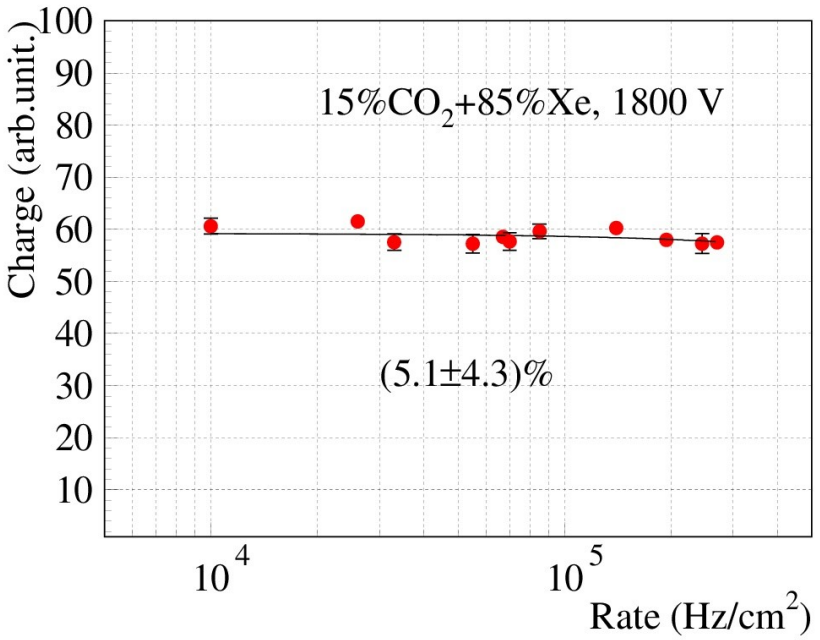
Kapton 25 µm



A short reminder

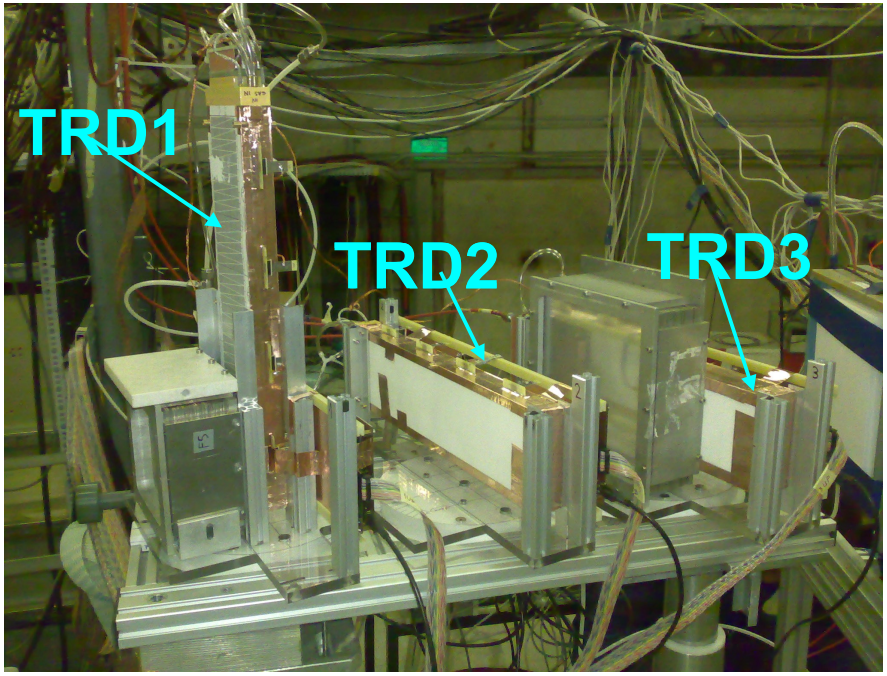
protons, p = 1.5 GeV/c

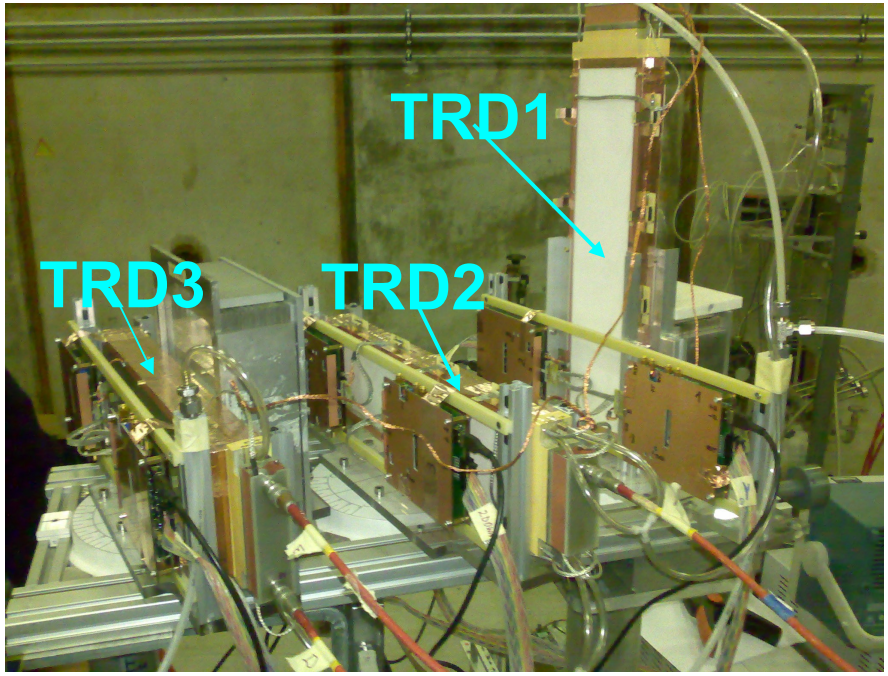




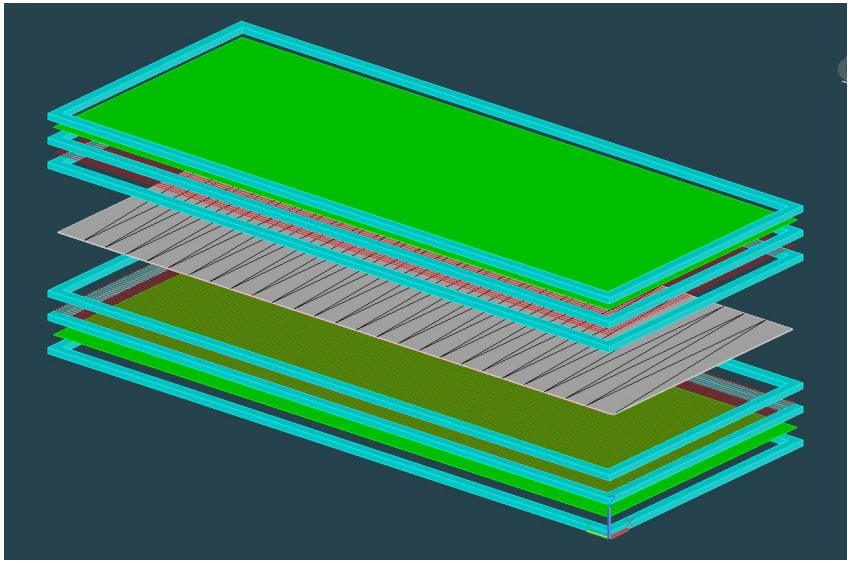
- ***The amplitude of the signal is less affected by the positive space charge built up at high rate than the integrated charge***

Experimental set-up of the three Bucharest prototypes





- *3 MWPC – 72 triangular pads each, with a total area of 36 x 8 cm²*
- *16 triangular pads were readout for each MWPC*
- *2 regular foil radiators: Reg1 (20/500/120) & Reg2 (20/250/220)*
- *FEE – FASP-V0*
- *Ar-CO_2 & Xe-CO_2 gas mixtures were used*

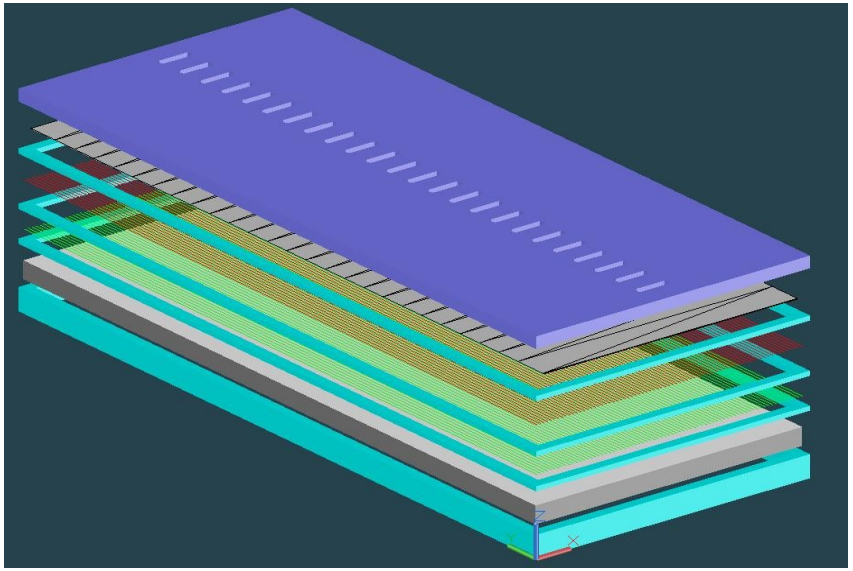


First version – TRD1

- 3 mm anode - cathode gap

Second version –TRD2

- 4 mm anode - cathode gap



Third version – TRD3

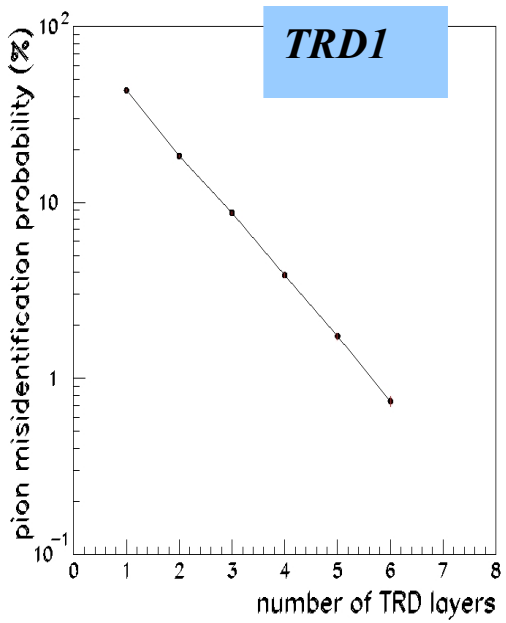
- 4 mm anode – cathode gap

- 4mm gap

In beam measured performance

Anode HV = 1700 V

Radiator: Reg2 (20/250/220)

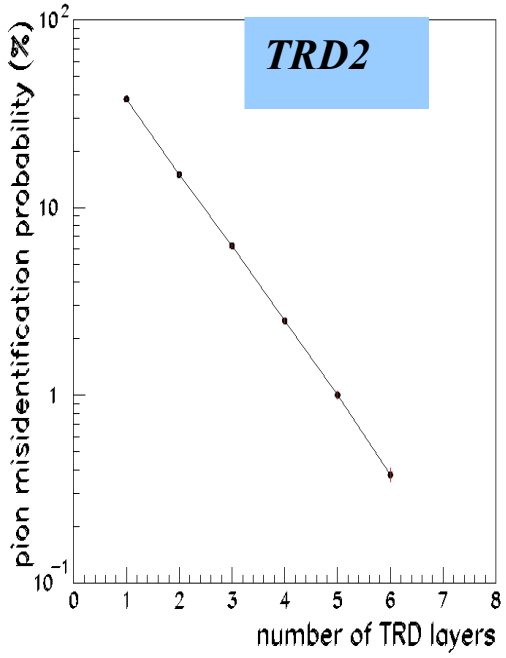


0.74% @ 6 TRD layers,

2 GeV/c momentum

Anode HV = 2000 V

Radiator: Reg1 (20/500/120)

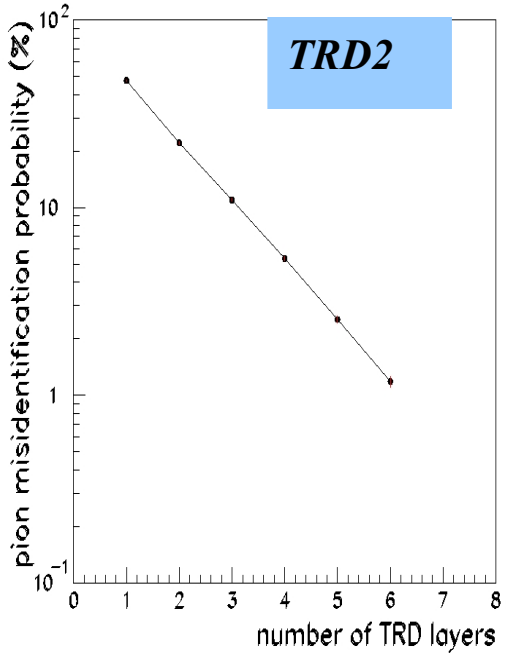


0.38% @ 6 TRD layers,

2 GeV/c momentum

Anode HV = 1900 V; Drift HV = 400

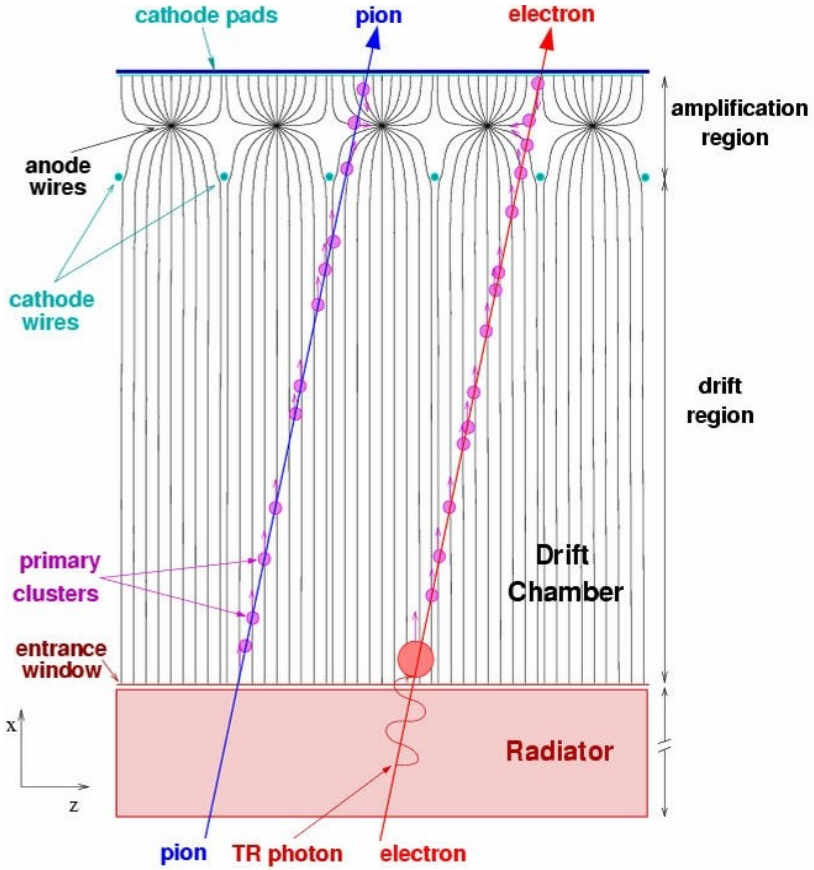
Radiator: Reg1 (20/500/120)

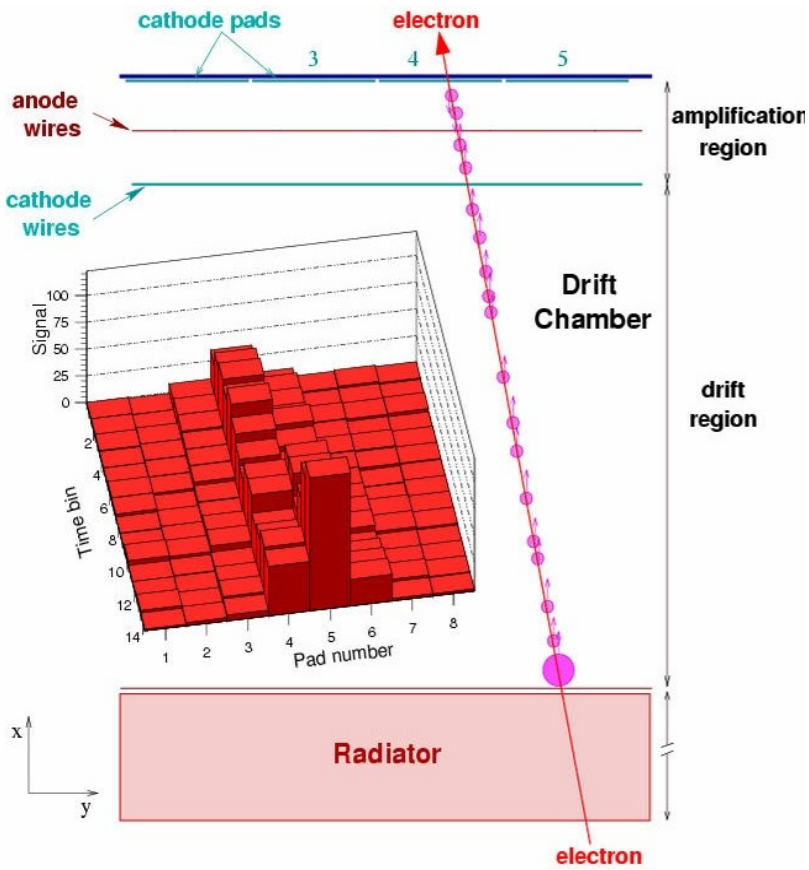


1.18% @ 6 TRD layers,

2 GeV/c momentum

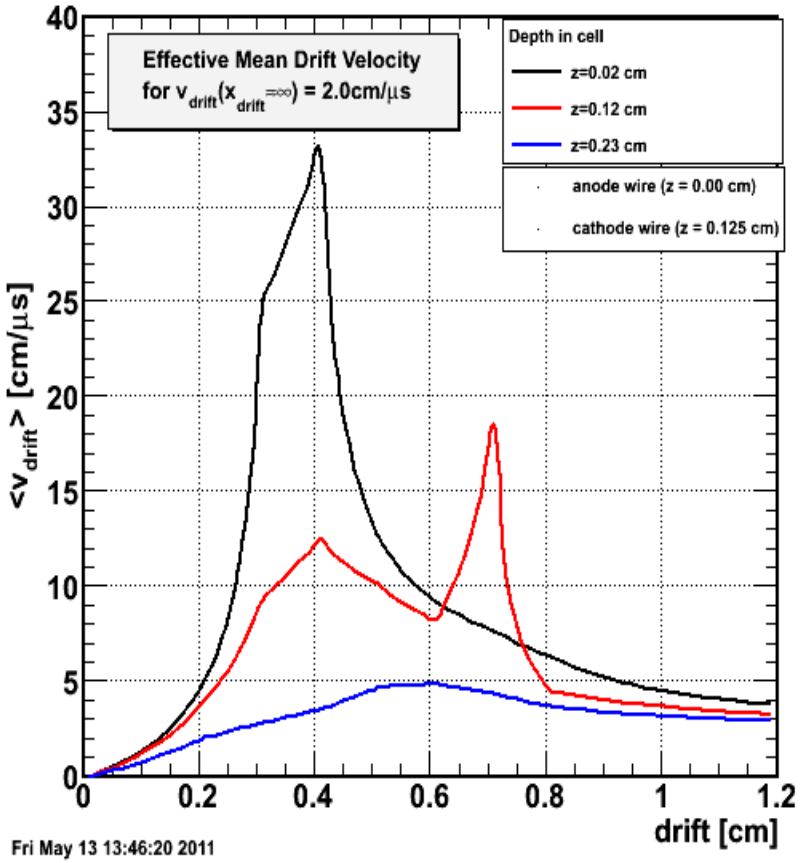
Why a drift zone is so special ?

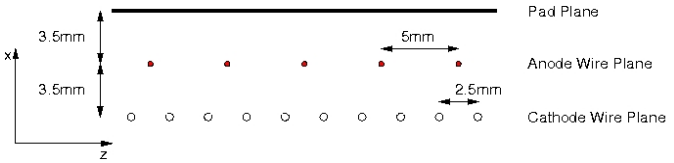


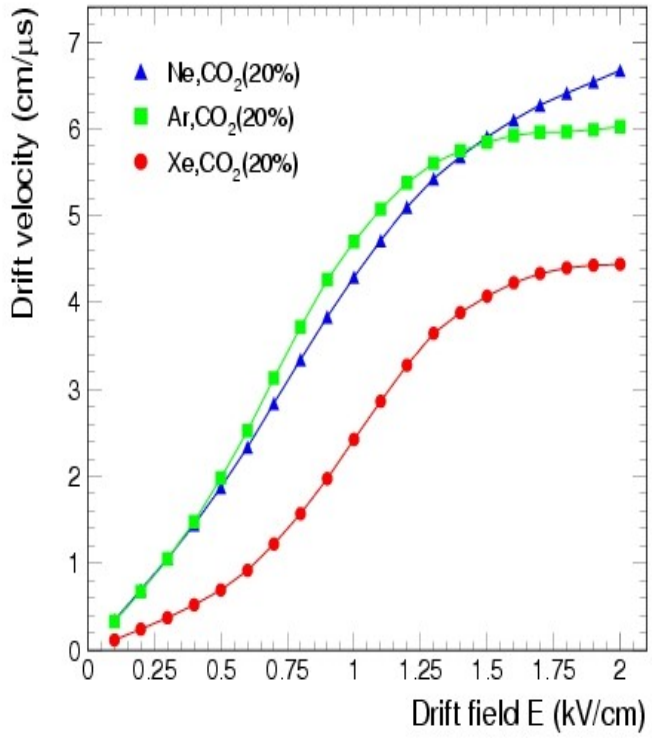


Why a drift zone is so special ?

85%Xe + 15%CO_2







In beam measured performance