Testarea in fascicul de electroni si pioni a celor doua arhitecturi de detectori TRD dezvoltati in DFH: tip camera multifilara dubla cu structura simetrica in raport cu electrodul de citire a semnalelor si tip camera multifilara simpla cuplata cu o zona de drift

CAPACITATI Modul III EU-FP7 Fizica Hadronica
3, 179 EU / 11.07.2012

Double -sided TRD prototype version

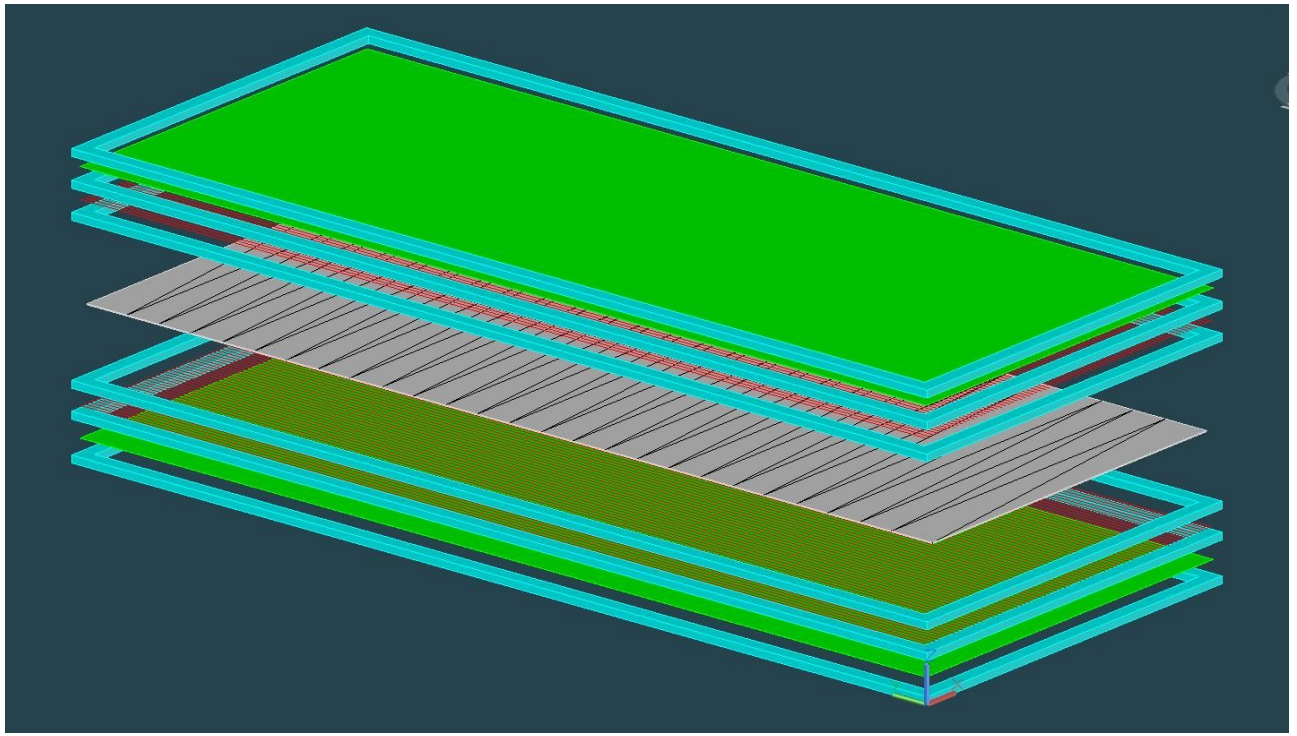
- 2 MWPC readout by the a common double sided pad plane

- readout electrode Cr(20 nm)/Al(200nm) evaporated on 25 μm kapton foil

- triangular shape of readout pads

- readout cell area 1 x 8 cm^2

- 3 mm anode wire pitch



First version – TRD1

- 3 mm anode – cathode gap

Second version – TRD2

- 4 mm anode – cathode gap

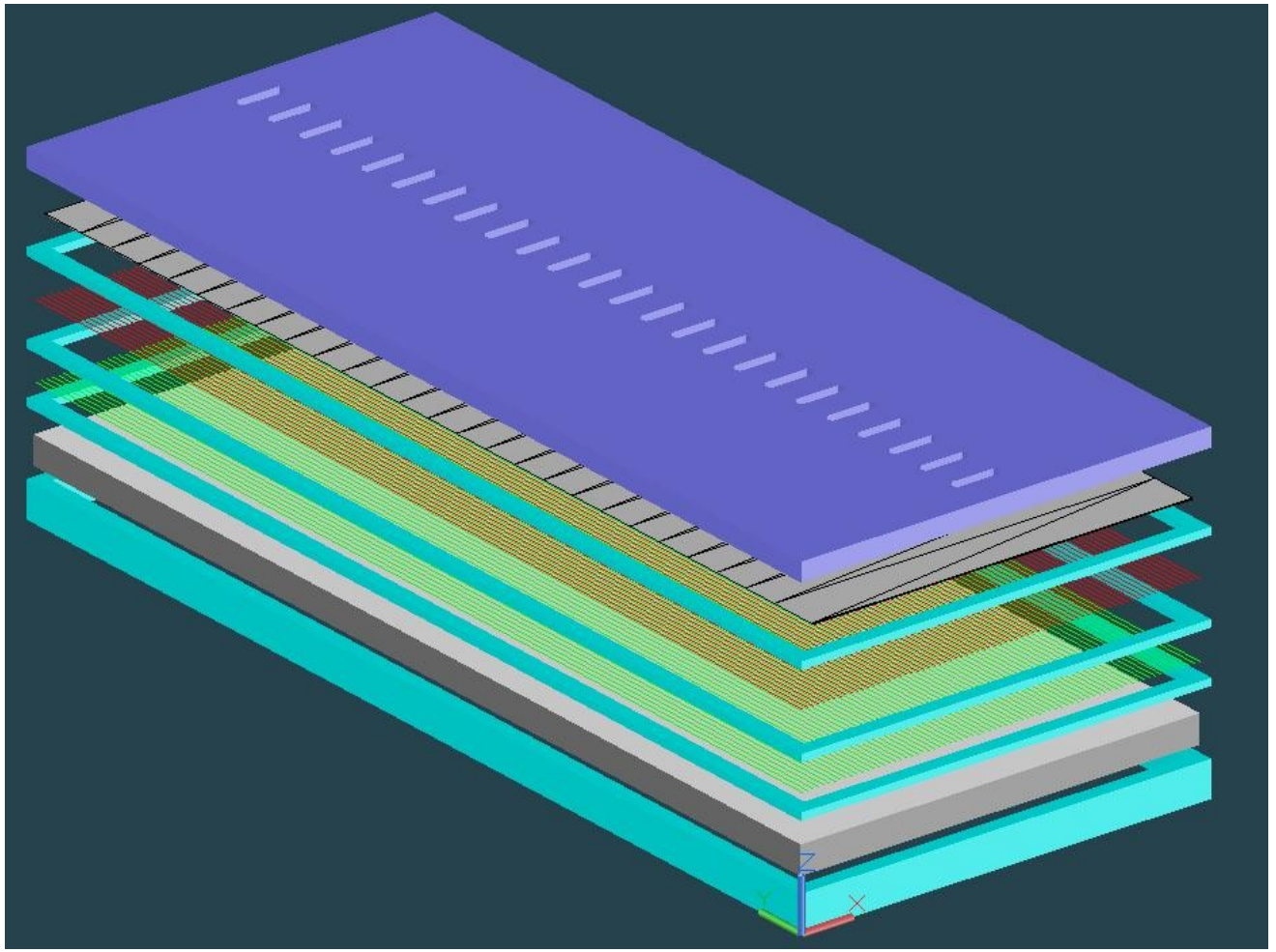
Single -sided TRD prototype version

- single MWPC + 4 mm drift region

- readout electrode 300 µm pcb

- triangular shape of readout pads

- readout cell area 1 x 8 cm²



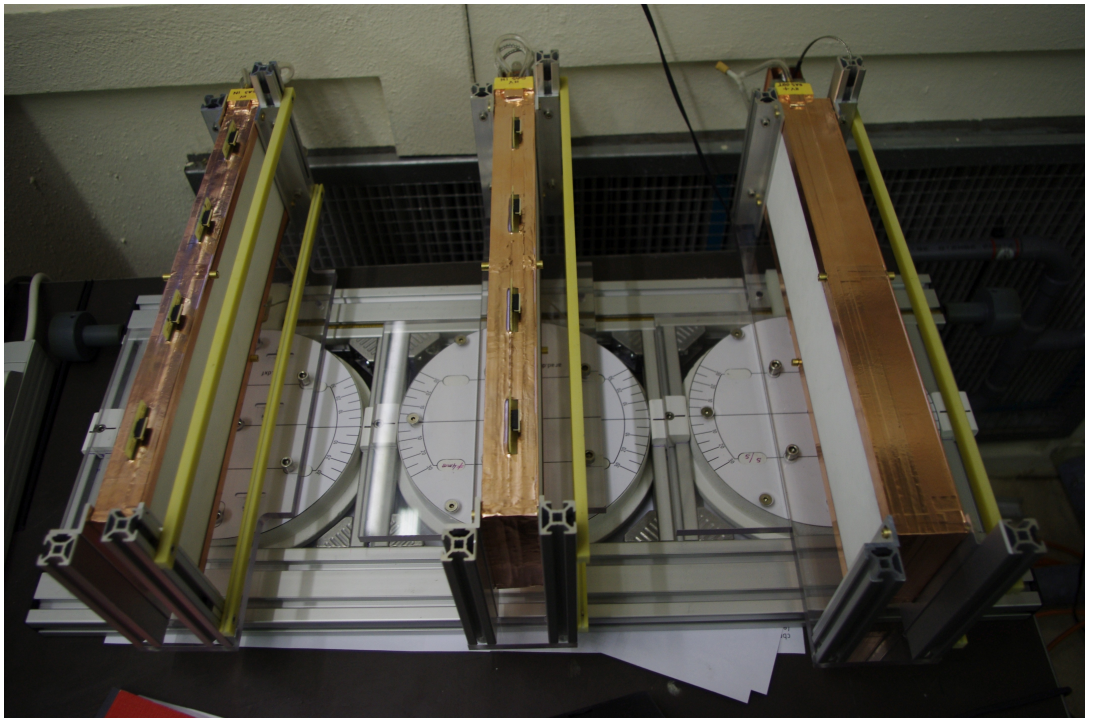
Third version – TRD3

- 4 mm anode – cathode gap

- 3 mm anode wire pitch

- 1.5 mm cathode wire pitch

Experimental set-up of the three Bucharest prototypes

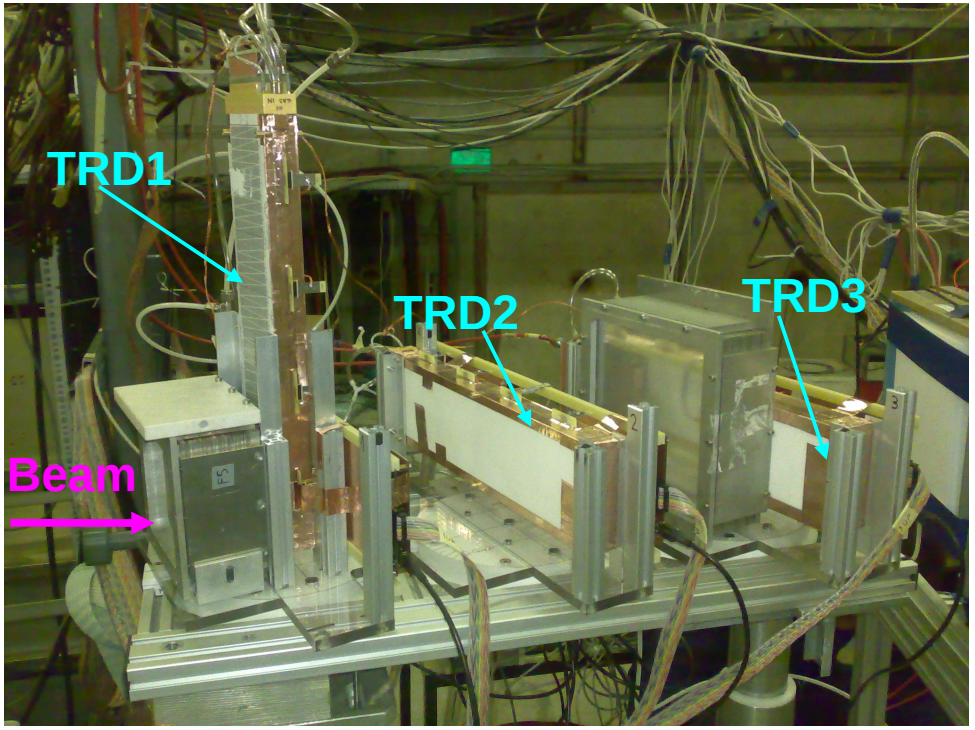


Mechanical support with turntables

- alignment and centering of the operated area in beam

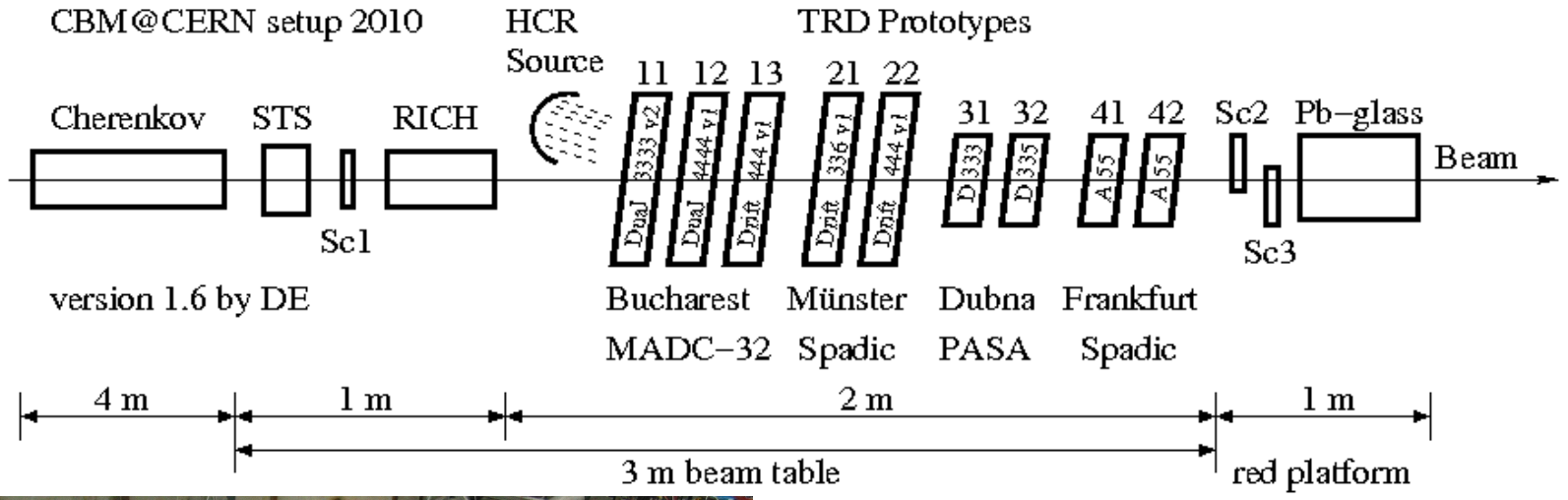
- different incidence angle: 0, 15, 30 degree

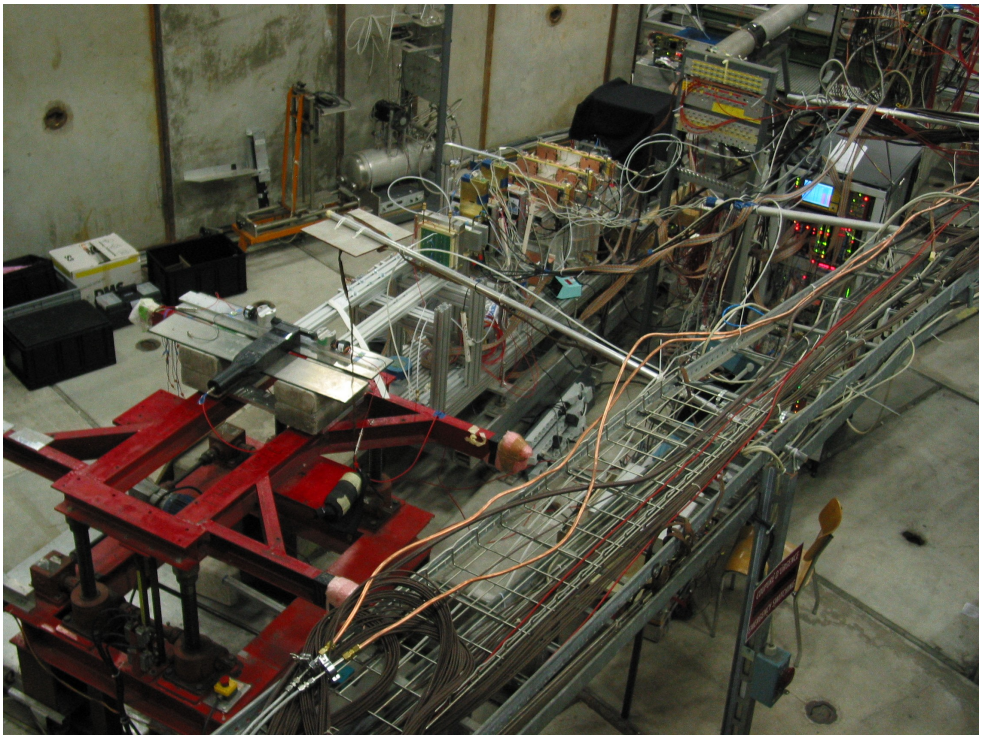
Experimental set-up of the three Bucharest prototypes



- *3 TRD prototypes – 72 triangular pads with a total area of 36 x 8 cm^2*
- *16 triangular pads were readout for each MWPC*
- *Gas mixture: Ar(80%)/CO_2(20%) & Xe(80%)/CO_2(20%)*
- *2 regular radiators: Reg1 (20/500/120) & Reg2 (20/250/220)*
- *FEE – FASP-V0*

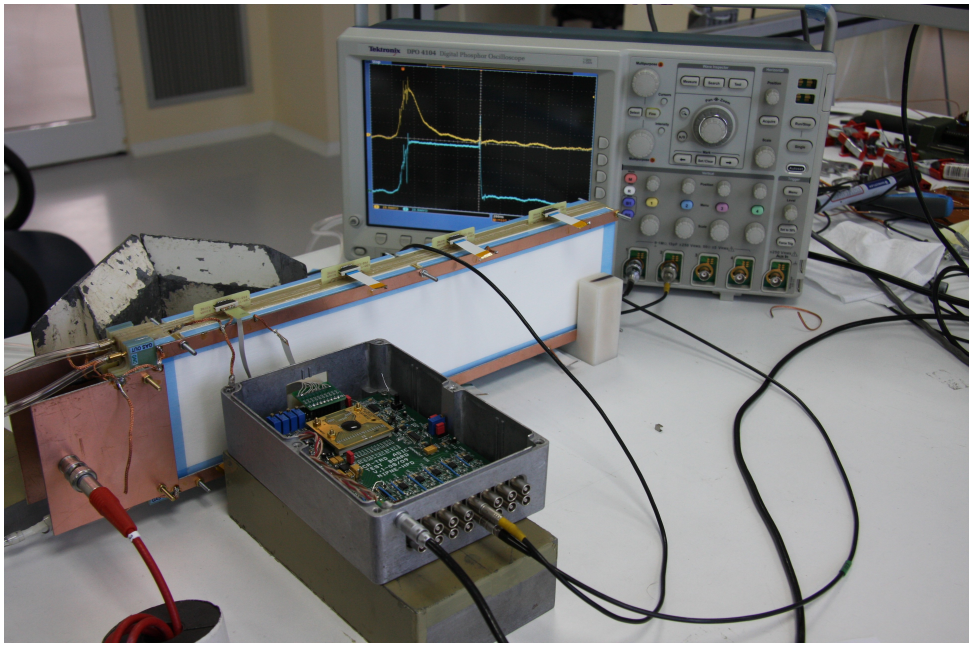
CBM common experimental set-up of in-beam test performed @ CERN T10/PS beam line





- *Cherenkov detector (e/pi identification)*
- *STS station*
- *Plastic Scintillator (beam trigger)*
- *RICH prototype*
- *3 TRD prototypes - Bucharest*
- *2 TRD prototypes - Muenster*
- *2 TRD prototypes - Dubna*
- *2 TRD prototypes - Frankfurt*
- *2 Plastic Scintillators (beam trigger)*
- *Pb-glass calorimeter (e/pi identification)*

Signal processing



FEE - Fast Analog Signal Processor FASP-VO

8 input/output channels

Gain: 6.1 mV/fC

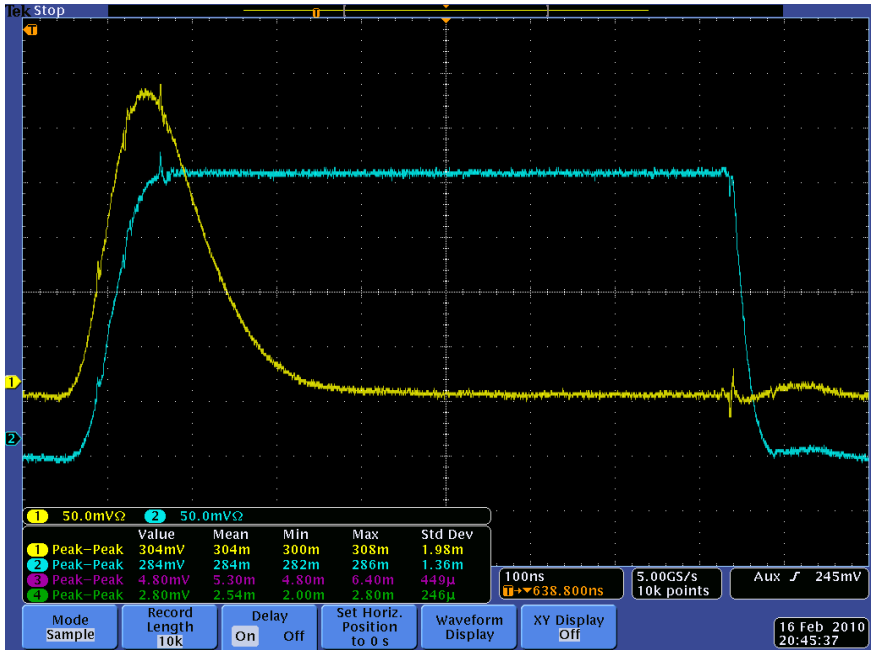
Analog channel outputs:

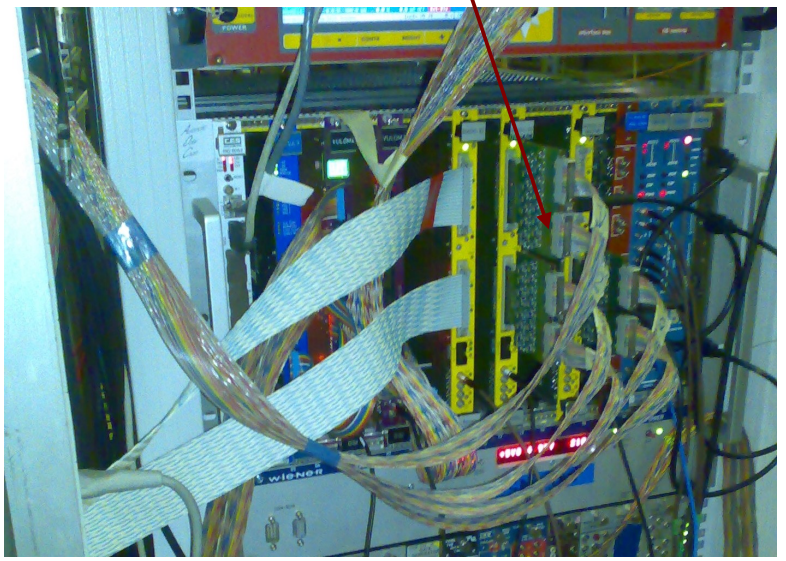
a) fast semi-Gaussian output signal

b) peak sense output signal

In-beam test:

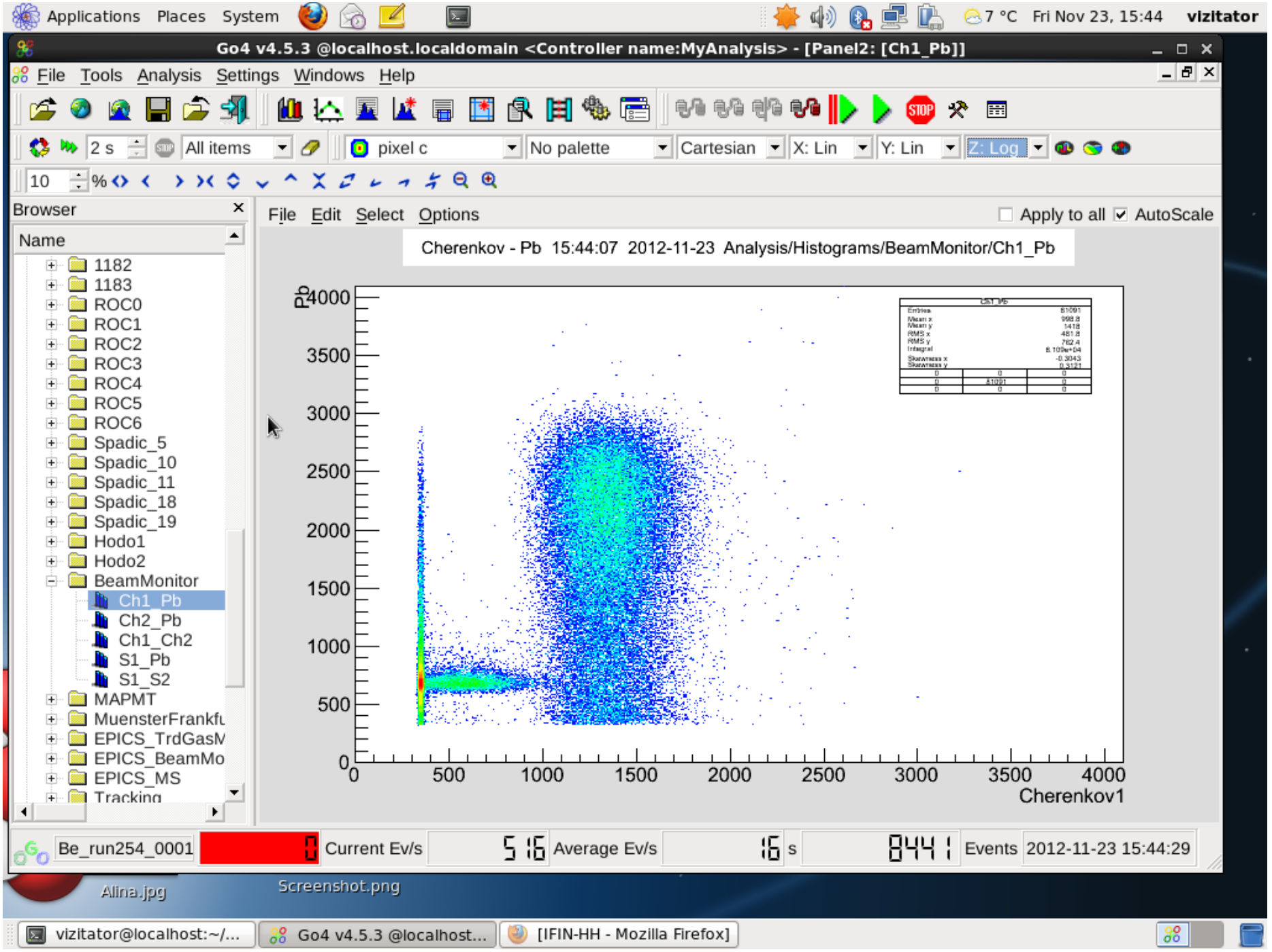
- *peak sens output signal;*
- *Mesytec ADC readout;*
- *DAQ: MBS*





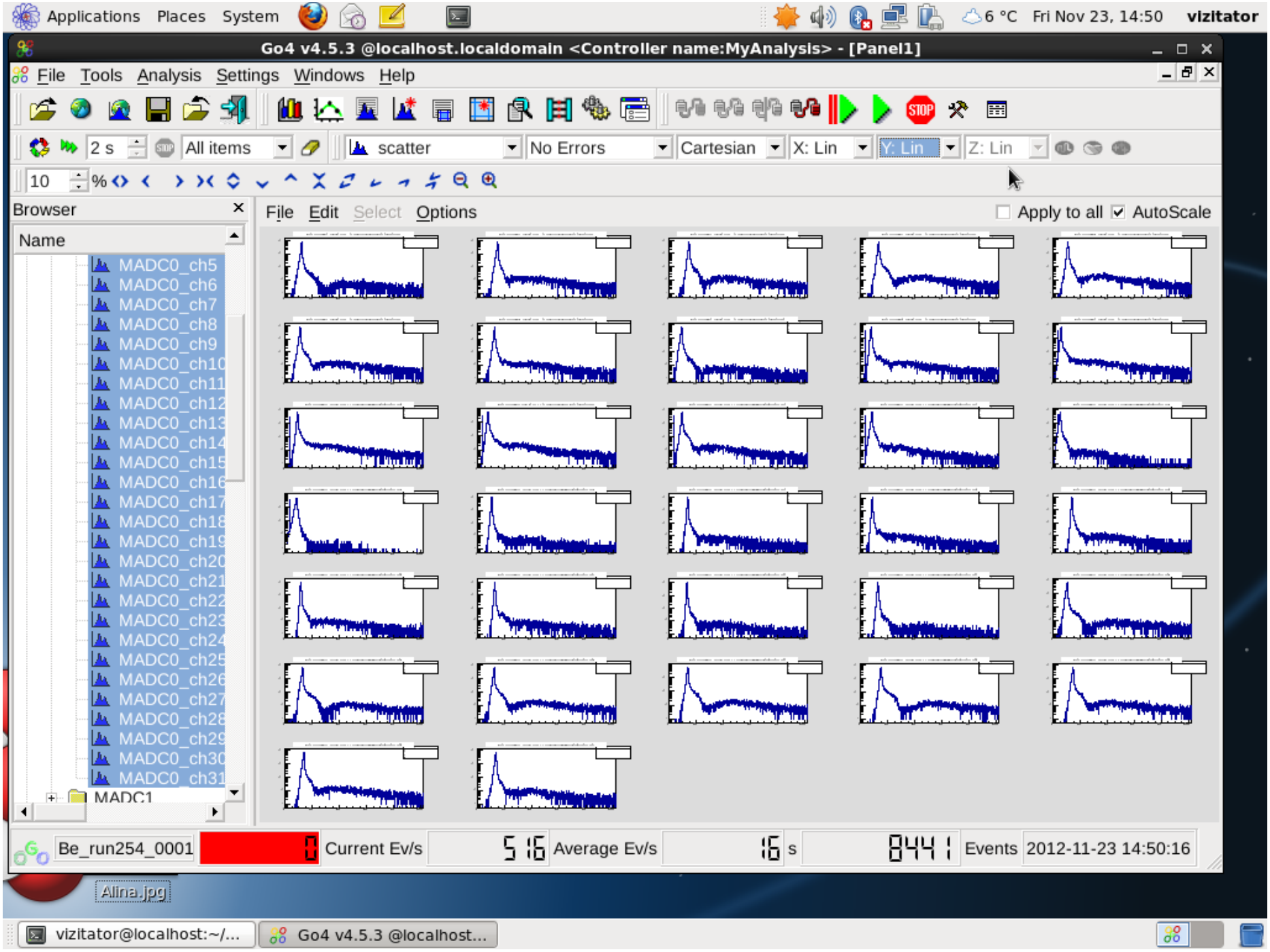
Go4 on-line monitoring

Go4 = GSI Object Oriented On-line-Off-line



Go4 on-line monitoring

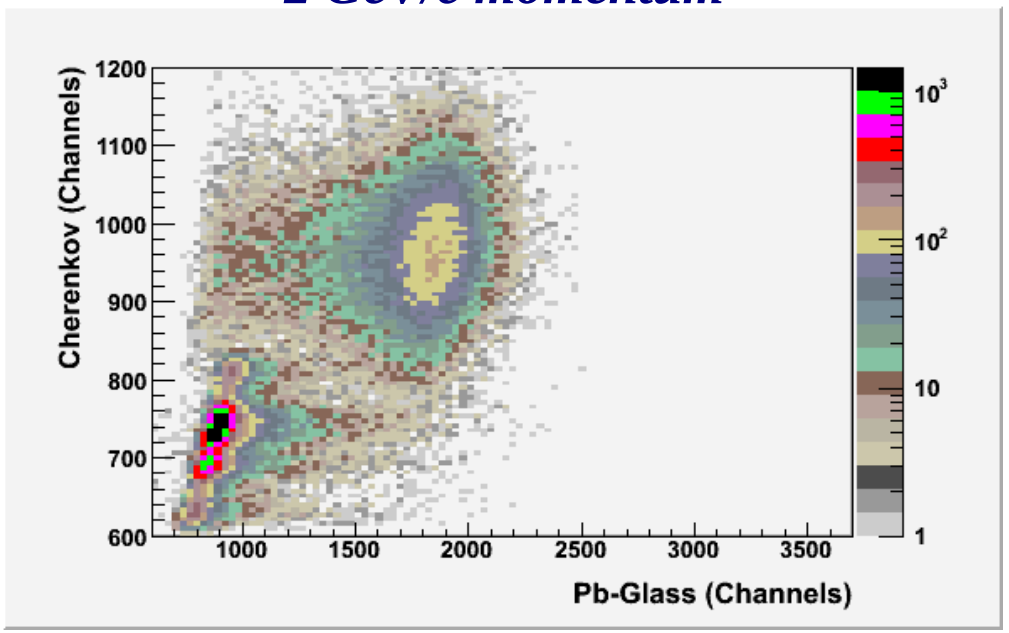
Go4 = GSI Object Oriented On-line-Off-line



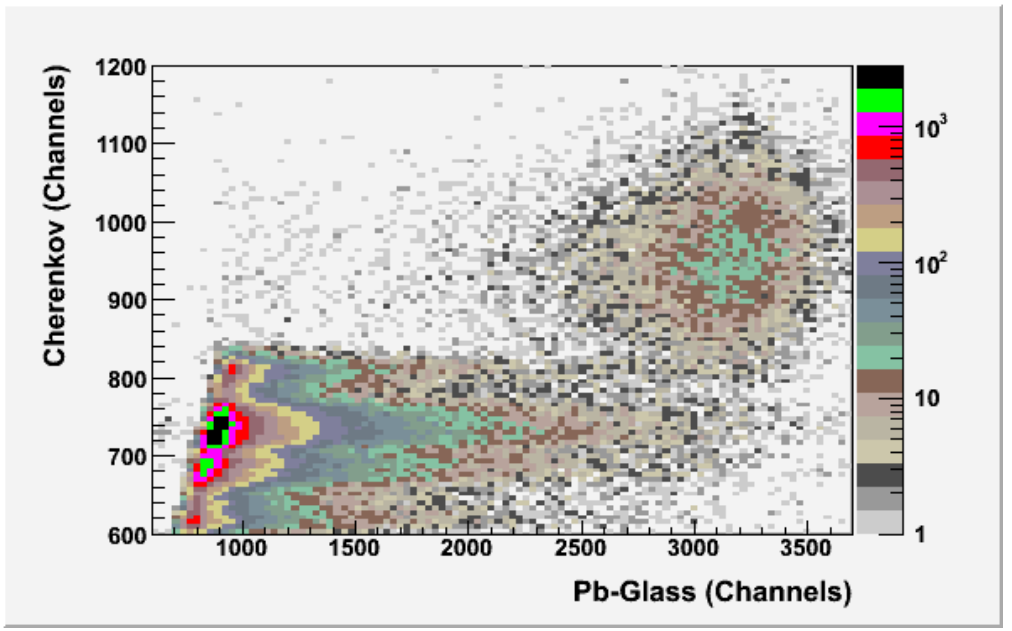
Off -line calibration and analysis – ROOT

Electron – pion identification

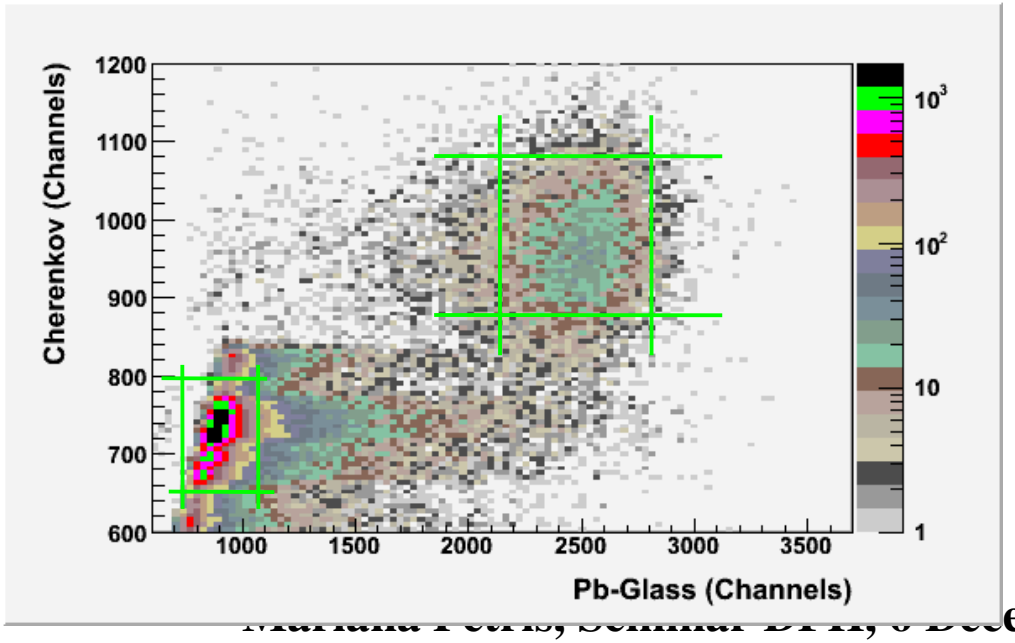
2 GeV/c momentum



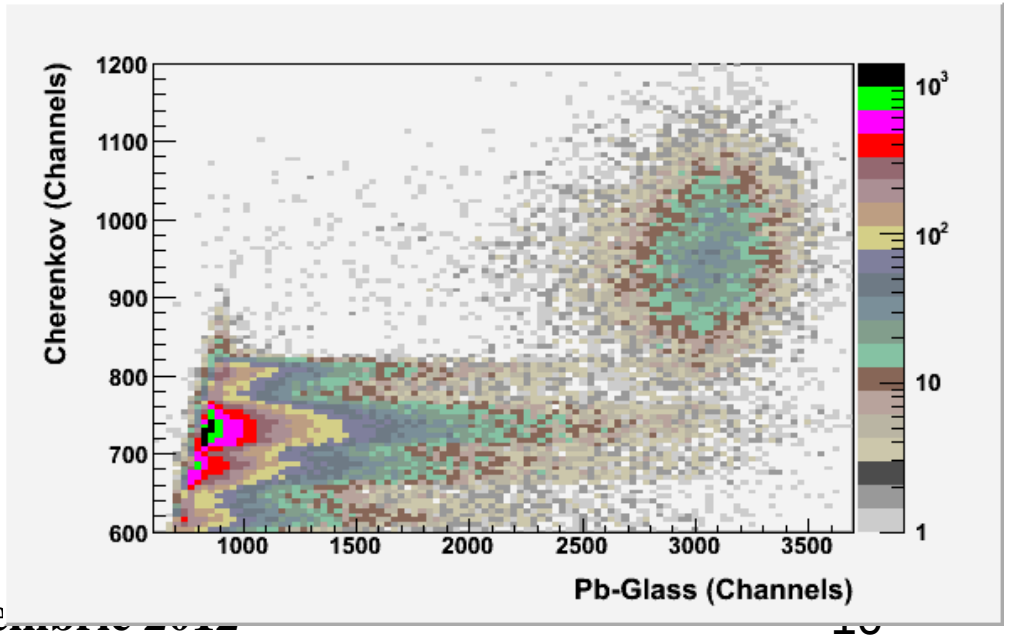
4 GeV/c momentum



3 GeV/c momentum



5 GeV/c momentum

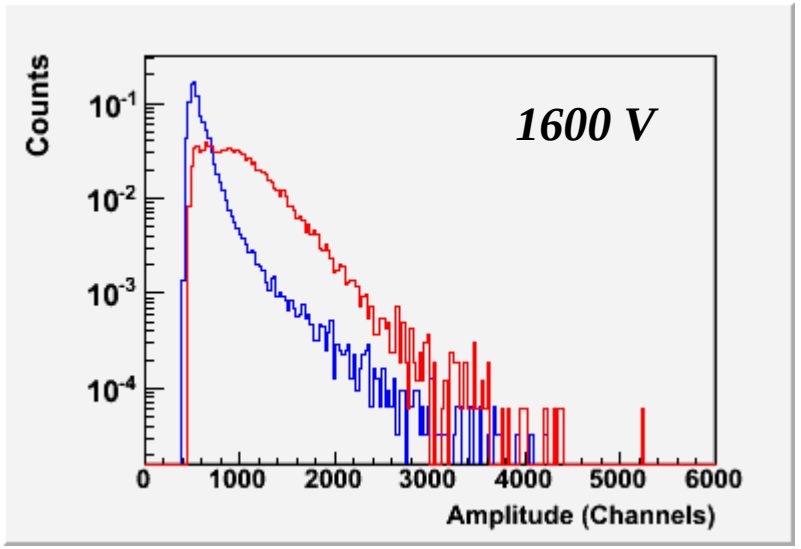


Pulse height distribution for electrons and pions

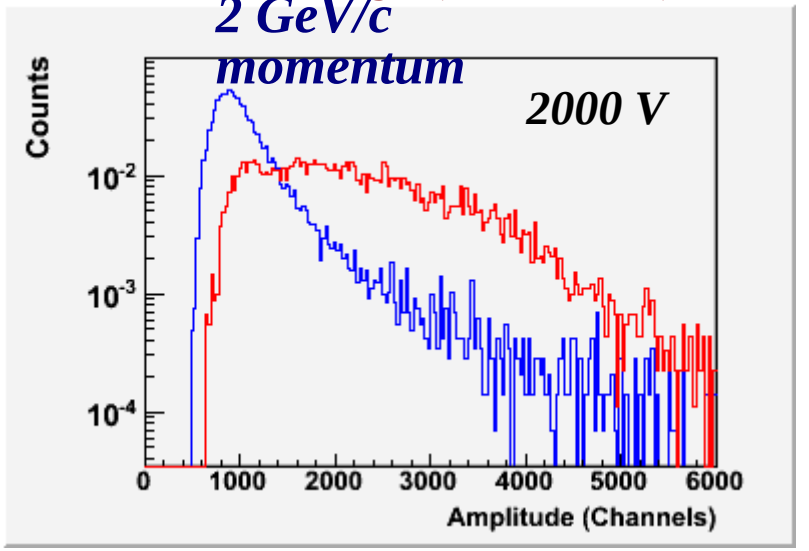
TRD1 4 gaps x 3 mm, radiator: Reg2 (20/250/220)

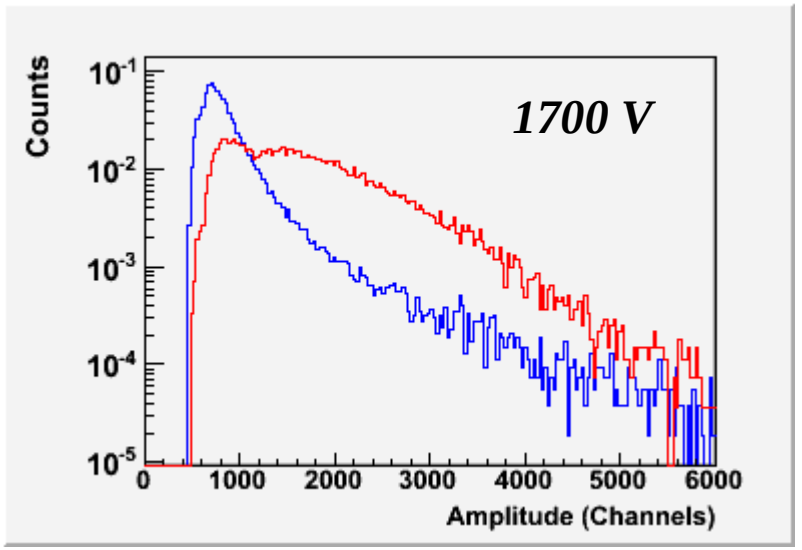
2 GeV/c momentum

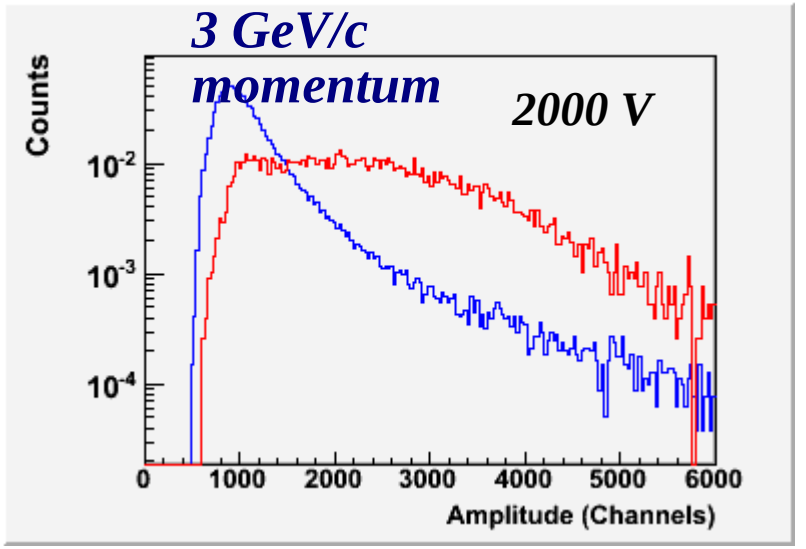
TRD2 4 gaps x 4 mm, radiator: Reg1 (20/500/120)



Gas mixture: 80%Xe+20%CO_2

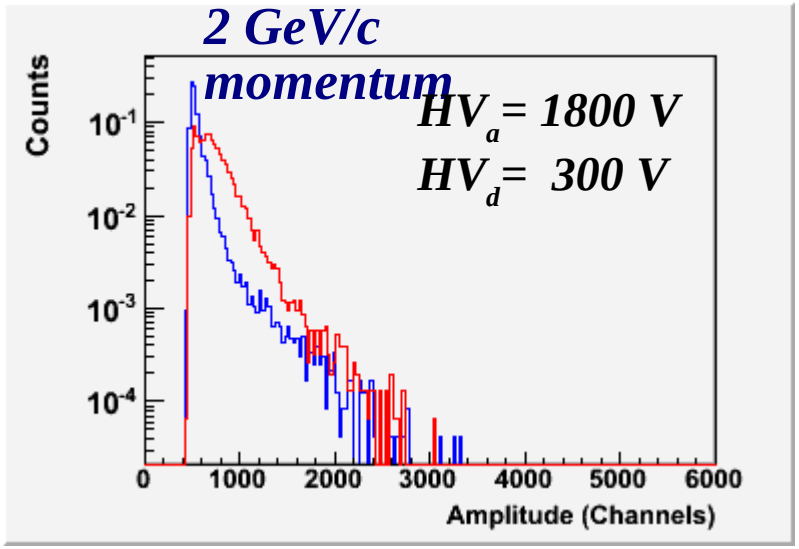




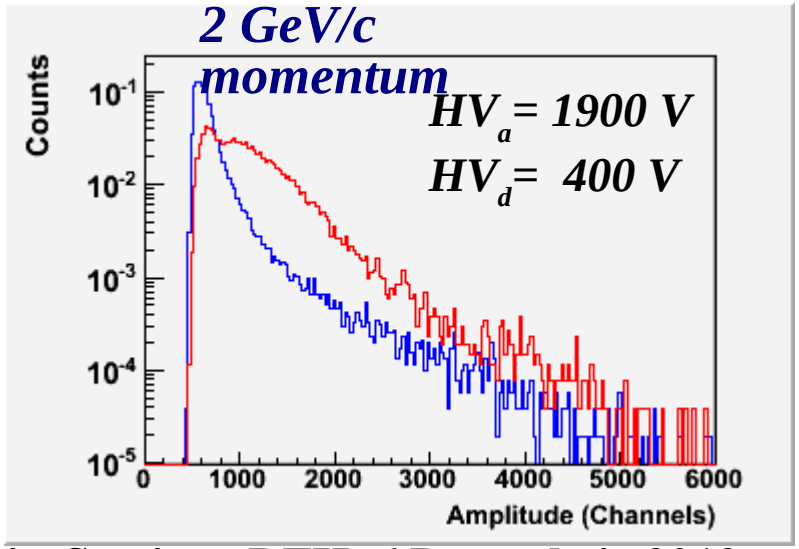


Pulse height distribution for electrons and pions

TRD3 2 gaps x 4 mm + 4 mm drift
radiator: Reg1 (20/500/120)



Gas mixture:
80%Xe+20%CO
2



Conclusions

Beside the main activity of designing and building new detector prototypes for the in-beam test, there are also activities for:

- *designing and construction of mechanical components needed for alignment and centering of them in the beam line*
- *hardware and software configuration of DAQ system*
- *on-line data monitoring*
- *preparation of off-line analysis*
- *the obtained results were included in:*

- *e/pi identification and position resolution of high granularity single sided TRD prototype*

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2nd European Nuclear Physics Conference - EuNPC, 16-21 September 2012 Bucharest

- *e/pi rejection performance and systematic studies of position resolution of Bucharest TRD prototype*

M. Tarzila, V. Aprodu, D. Bartos, A. Bercuci, V. Catanescu, F. Constantin, G.Caragheorgheopol, M. Petris, M. Petrovici, L. Prodan, A. Radu, L. Radulescu, V. Simion, P. Zaharia
20th CBM Collaboration Meeting, Kolkata, 24 - 28 September, 2012, India,