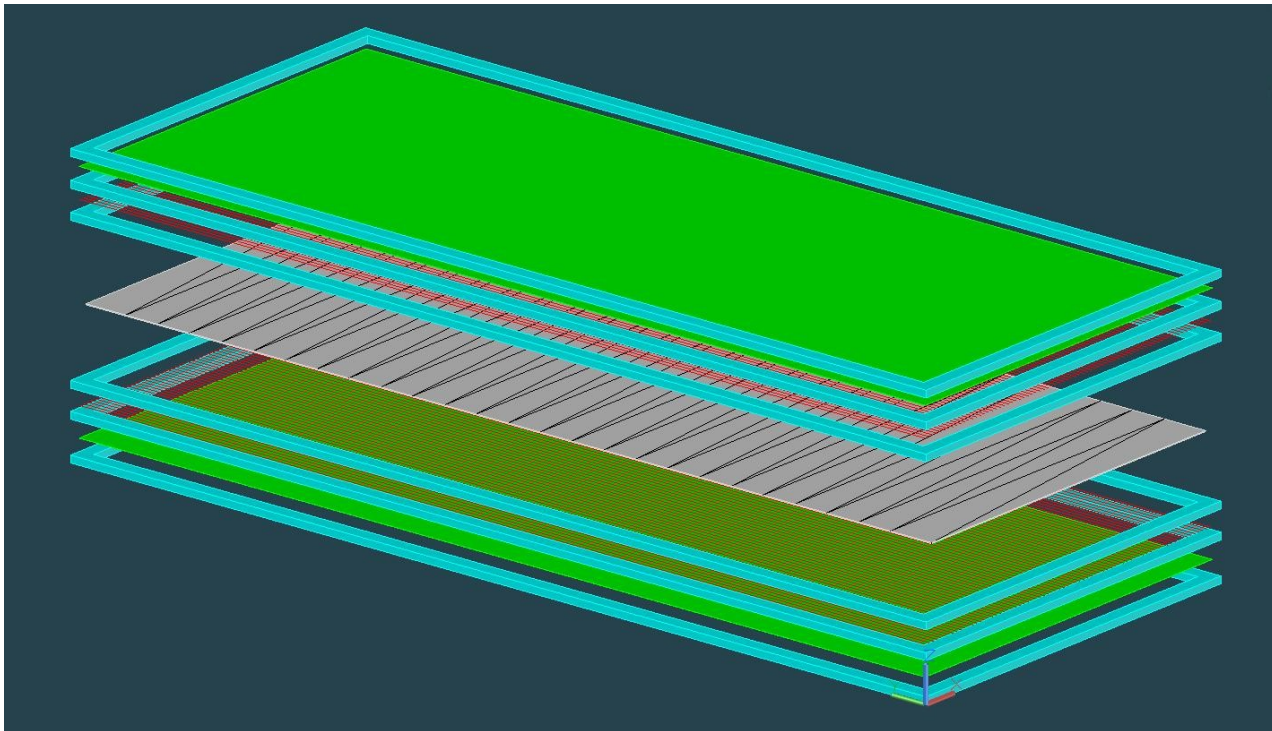


*Testarea in fascicul de electroni si pioni a celor doua arhitecturi de detectori TRD dezvoltati in DFH: tip camera multifilara dubla cu structura simetrica in raport cu electrodul de citire a semnalelor si tip camera multifilara simpla cuplata cu o zona de drift*

*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  $\mu\text{m}$  kapton foil*
- *triangular shape of readout pads*
- *readout cell area 1 x 8 cm<sup>2</sup>*
- *3 mm anode wire pitch*



*First version – TRD1*

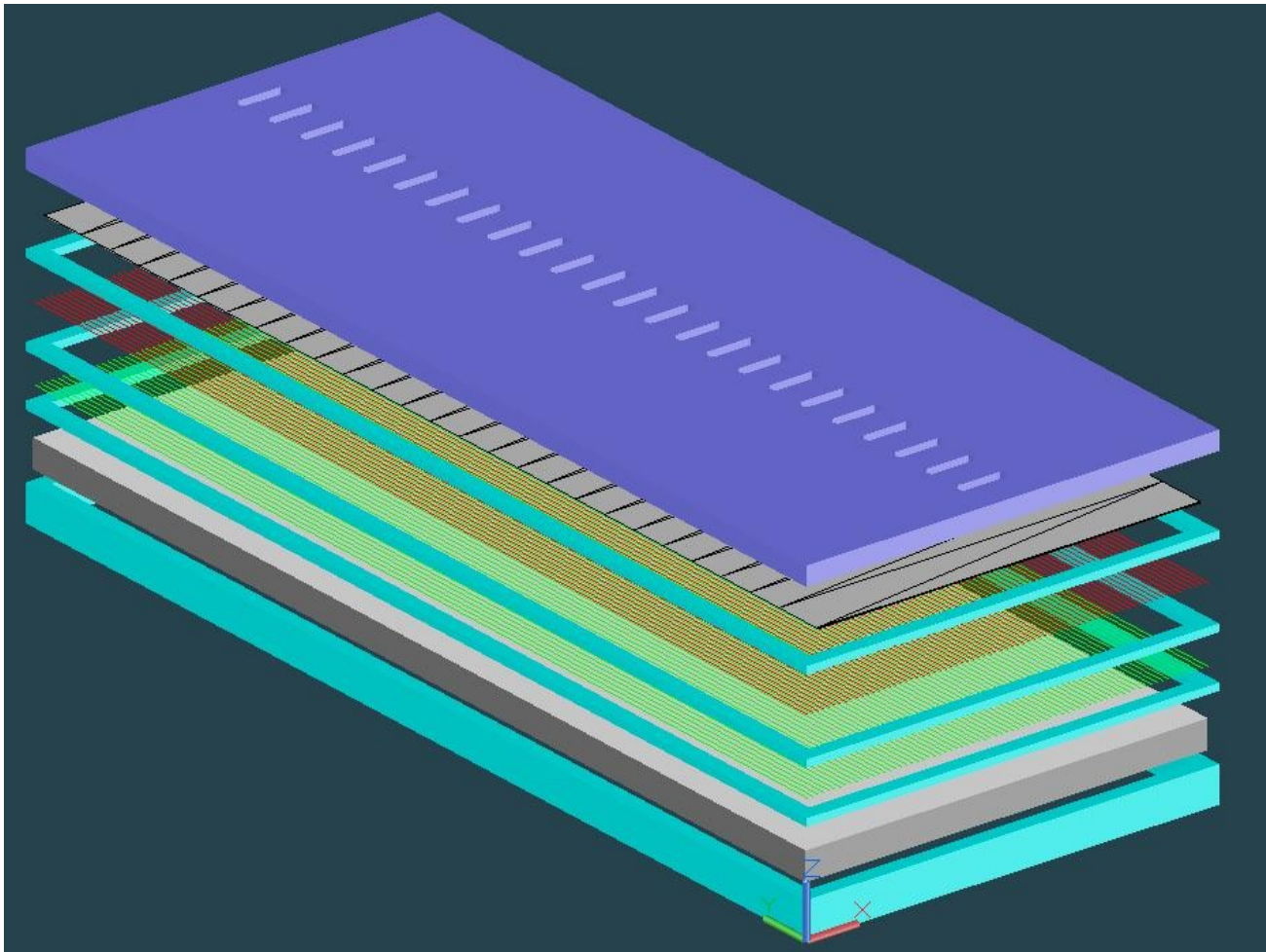
*- 3 mm anode – cathode gap*

*Second version – TRD2*

*- 4 mm anode – cathode gap*

# *Single -sided TRD prototype version*

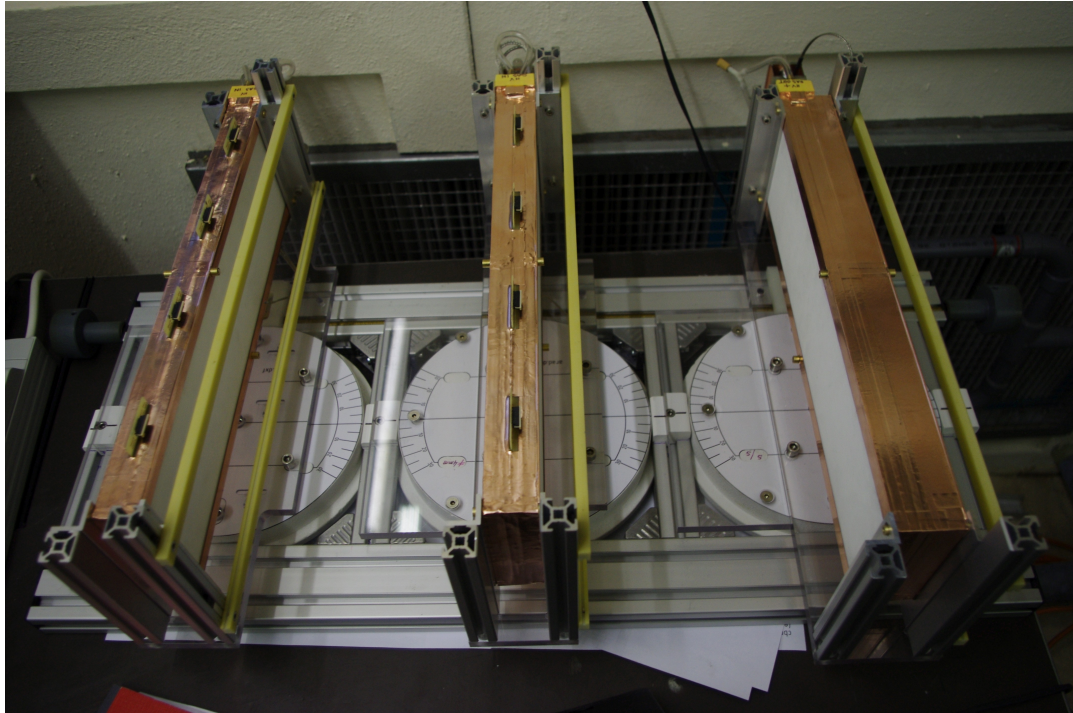
- *single MWPC + 4 mm drift region*
- *readout electrode 300  $\mu\text{m}$  pcb*
- *triangular shape of readout pads*
- *readout cell area 1 x 8 cm<sup>2</sup>*



## *Third version – TRD3*

- *4 mm anode – cathode gap*
- *3 mm anode wire pitch*
- *1.5 mm cathode wire pitch*

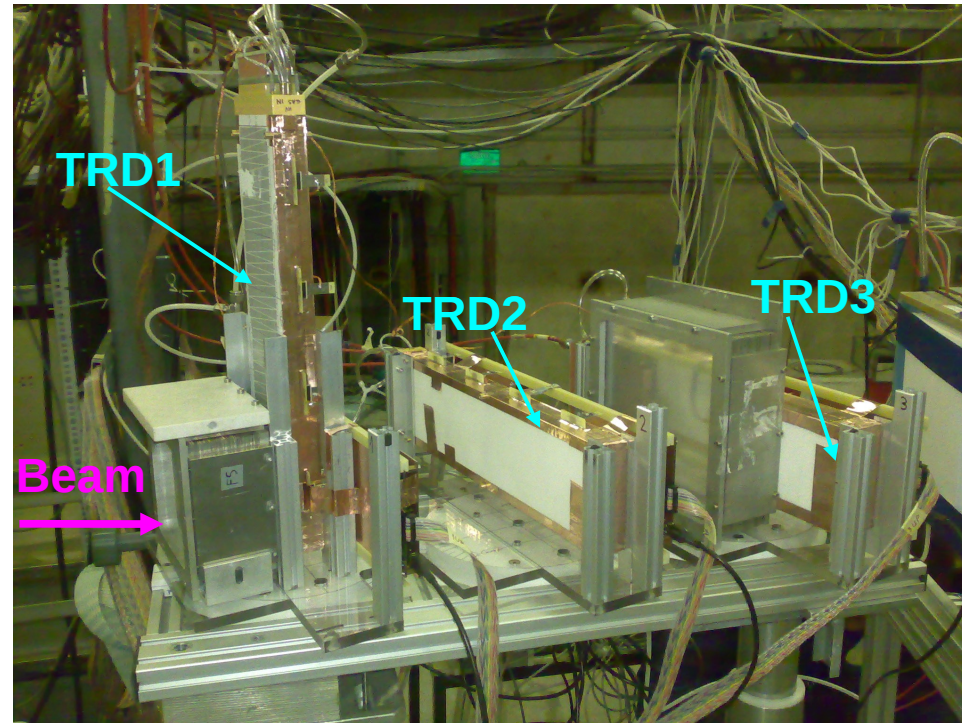
# *Experimental set-up of the three Bucharest prototypes*



*Mechanical support with turntables*

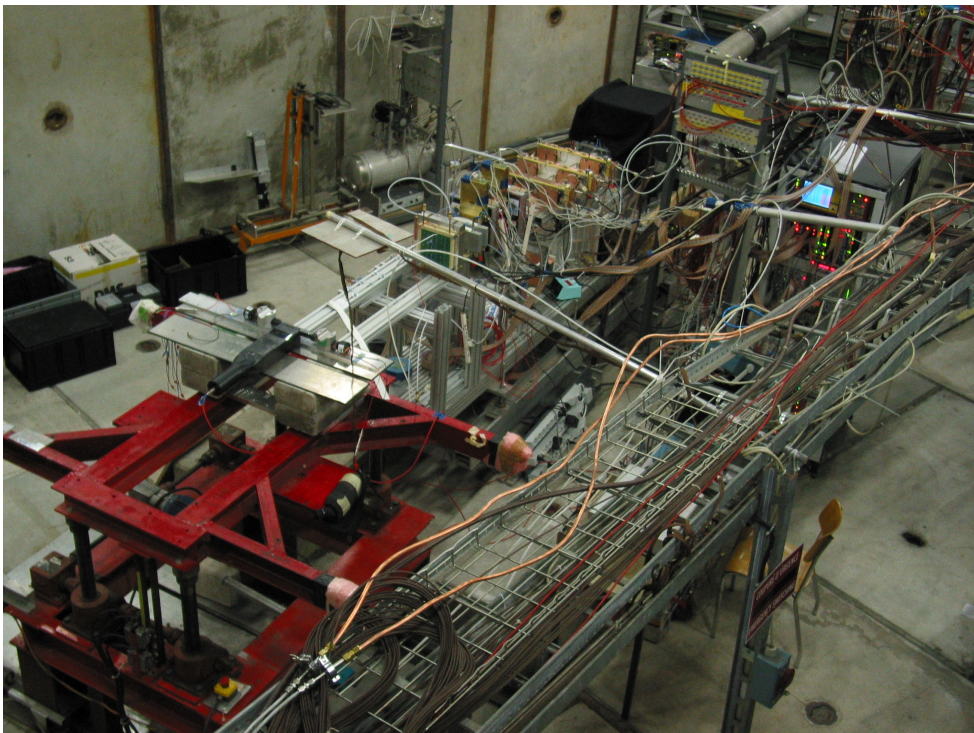
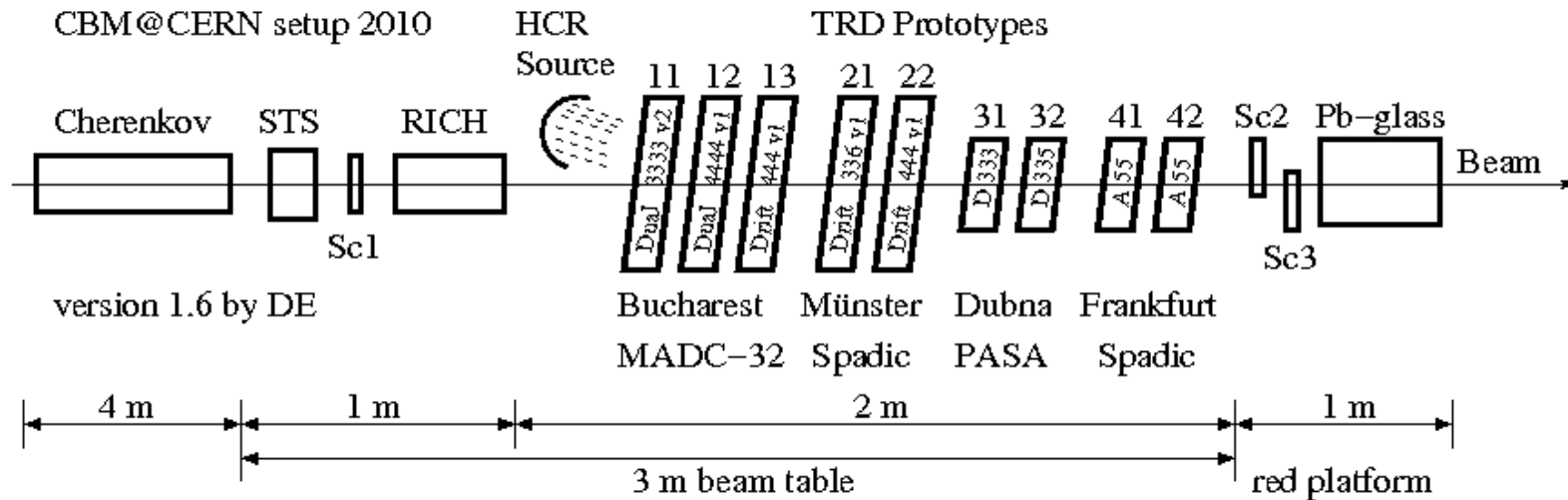
- alignment and centering of the operated area in beam*
- different incidence angle: 0, 15, 30 degree*

# *Experimental set-up of the three Bucharest prototypes*



- *3 TRD prototypes – 72 triangular pads with a total area of  $36 \times 8 \text{ cm}^2$*
- *16 triangular pads were readout for each MWPC*
- *Gas mixture: Ar(80%)/CO<sub>2</sub>(20%) & Xe(80%)/CO<sub>2</sub>(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**

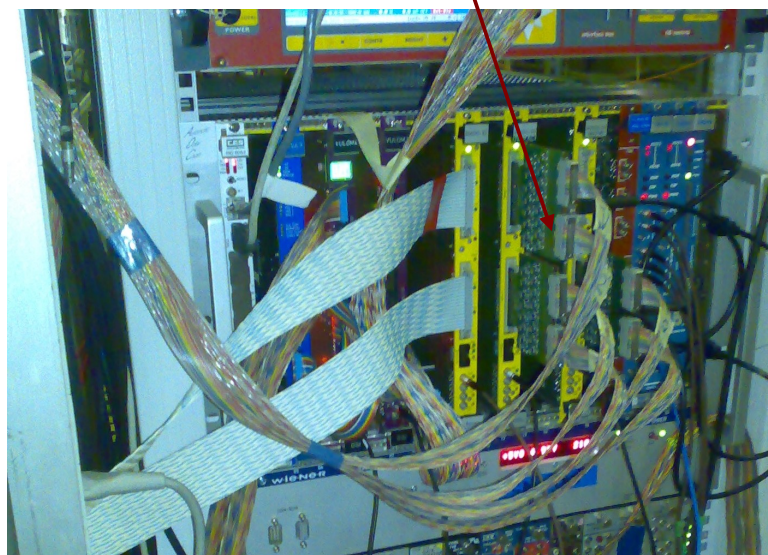
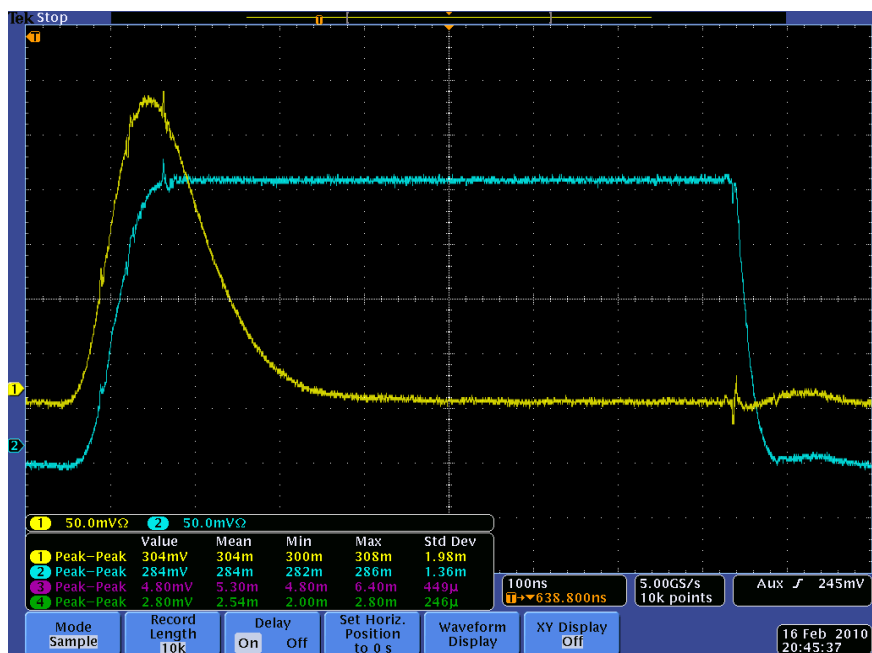
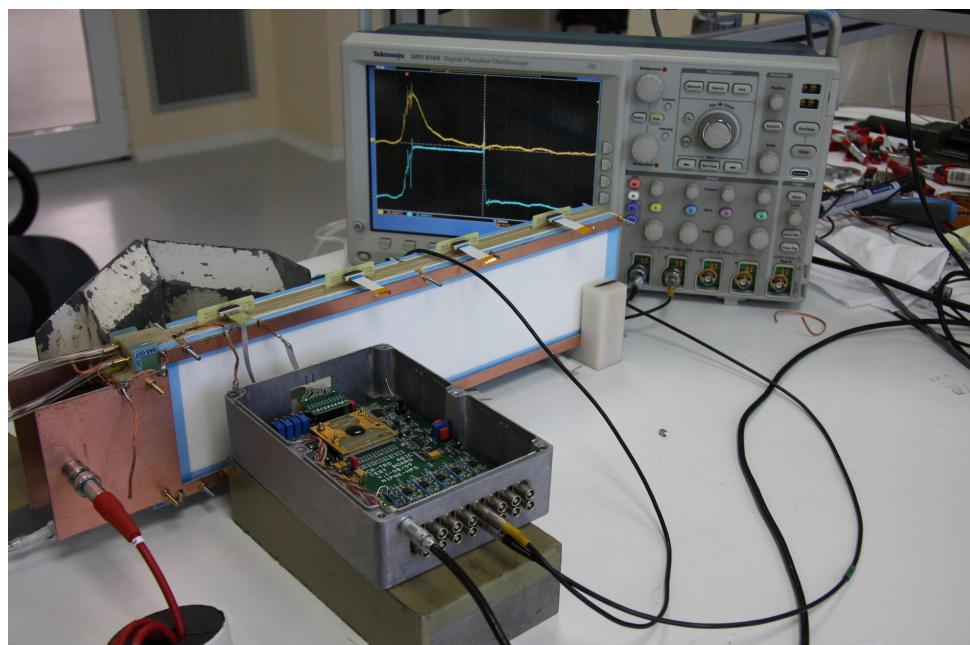
**Gain: 6.1 mV/fC**

**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

Applications Places System 7 °C Fri Nov 23, 15:44 vizitator

Go4 v4.5.3 @localhost.localdomain <Controller name:MyAnalysis> - [Panel2: [Ch1\_Pb]]

File Tools Analysis Settings Windows Help

2 s All items pixel c No palette Cartesian X: Lin Y: Lin Z: Log

10 %

Browser

- 1182
- 1183
- ROC0
- ROC1
- ROC2
- ROC3
- ROC4
- ROC5
- ROC6
- Spadic\_5
- Spadic\_10
- Spadic\_11
- Spadic\_18
- Spadic\_19
- Hodo1
- Hodo2
- BeamMonitor
  - Ch1\_Pb
  - Ch2\_Pb
  - Ch1\_Ch2
  - S1\_Pb
  - S1\_S2
- MAPMT
- MuensterFrankf
- EPICS\_TrGasM
- EPICS\_BeamMo
- EPICS\_MS
- Tracking

File Edit Select Options  Apply to all  AutoScale

Cherenkov - Pb 15:44:07 2012-11-23 Analysis/Histograms/BeamMonitor/Ch1\_Pb

LST ME		
Entries		81091
Mean x		998.8
Mean y		1418
RMS x		481.8
RMS y		762.4
Integral		8.109e+04
Skewness x		-0.3043
Skewness y		0.3121
0	0	0
0	41021	0
0	0	0

Be\_run254\_0001 ██████████ Current Ev/s **516** Average Ev/s **16** s **8441** Events 2012-11-23 15:44:29

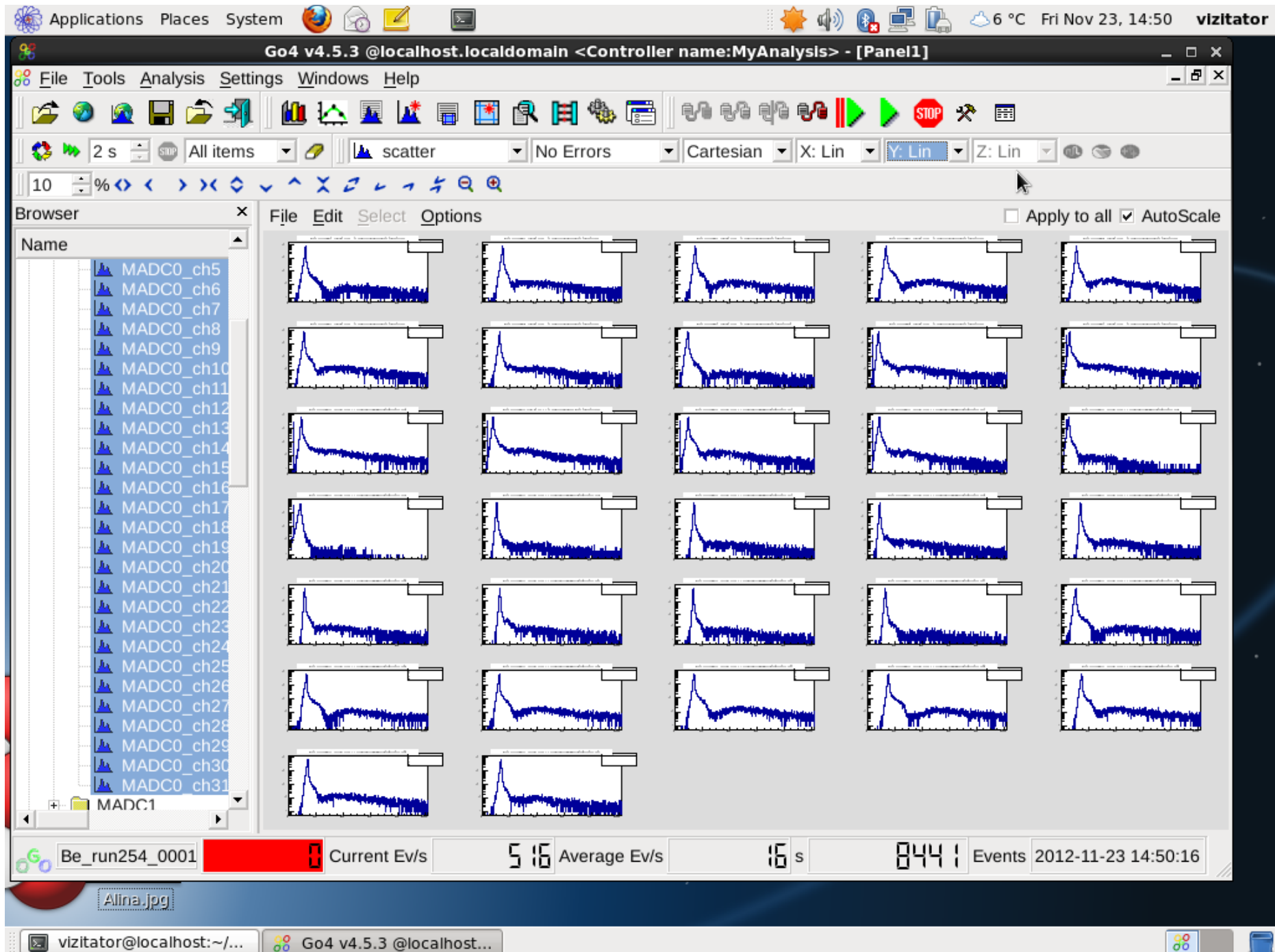
Alina.jpg Screenshot.png

vizitator@localhost:~/... Go4 v4.5.3 @localhost... [IFIN-HH - Mozilla Firefox]



# Go4 on-line monitoring

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

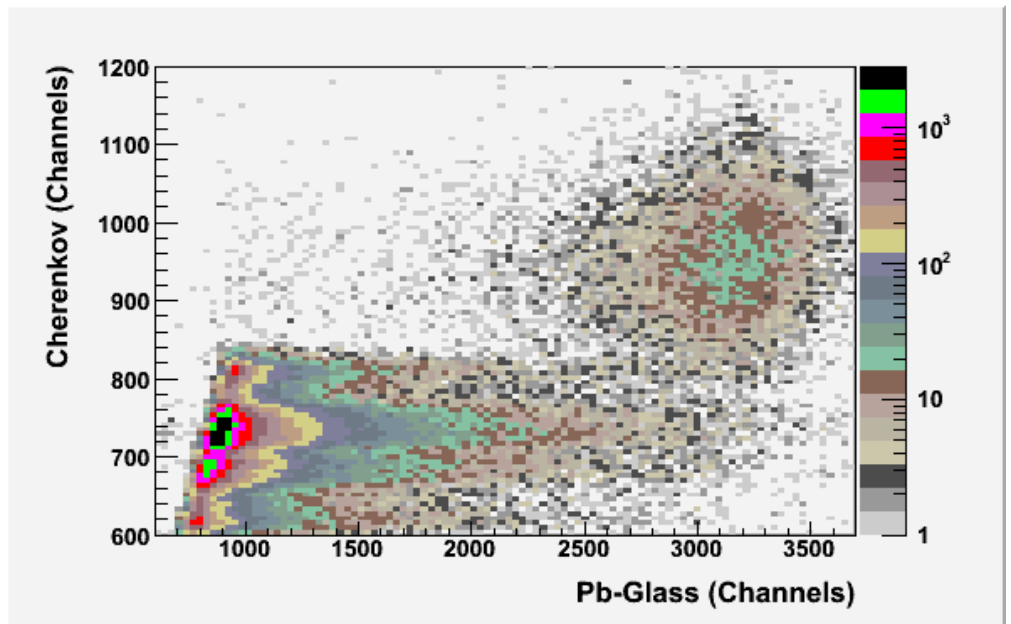
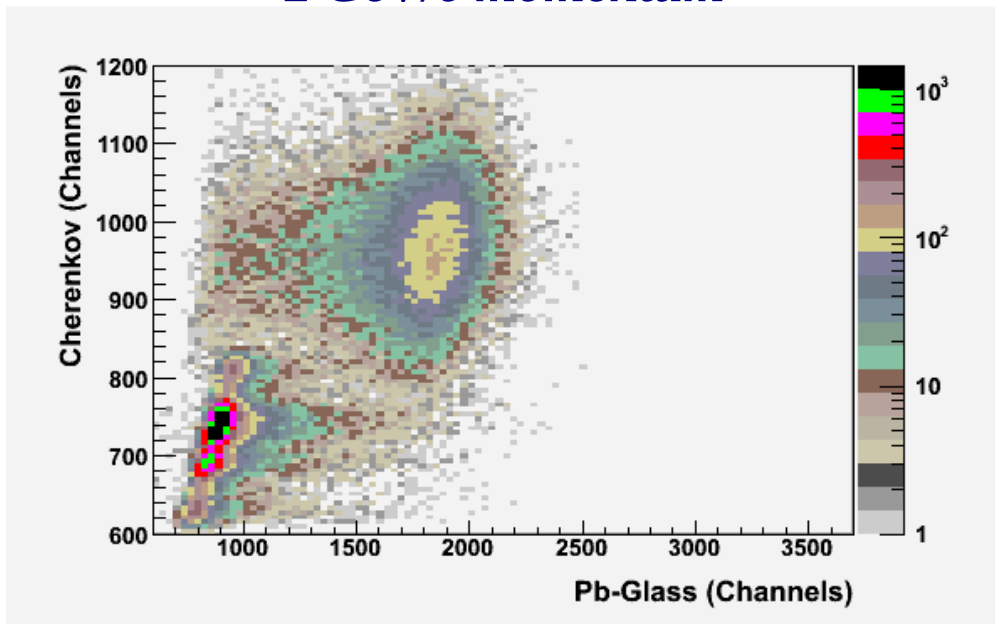


# Off-line calibration and analysis – ROOT

## Electron – pion identification

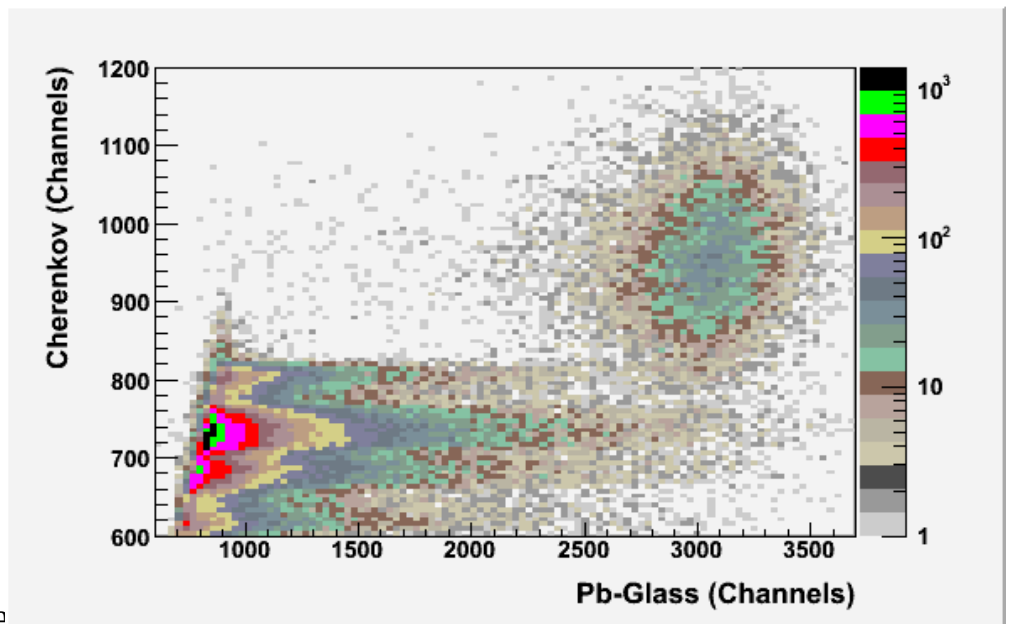
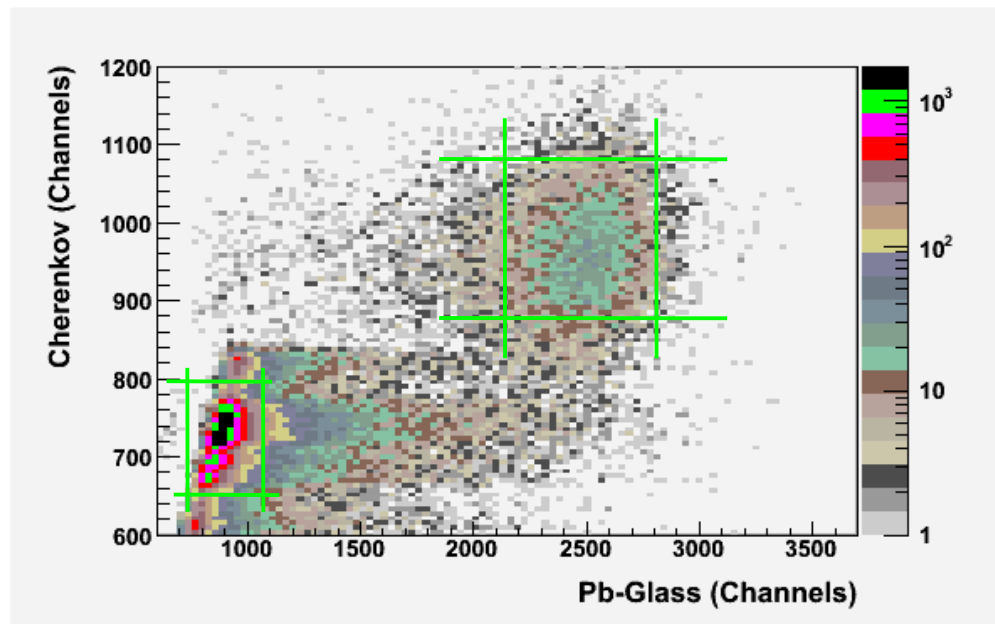
2 GeV/c momentum

4 GeV/c momentum



3 GeV/c momentum

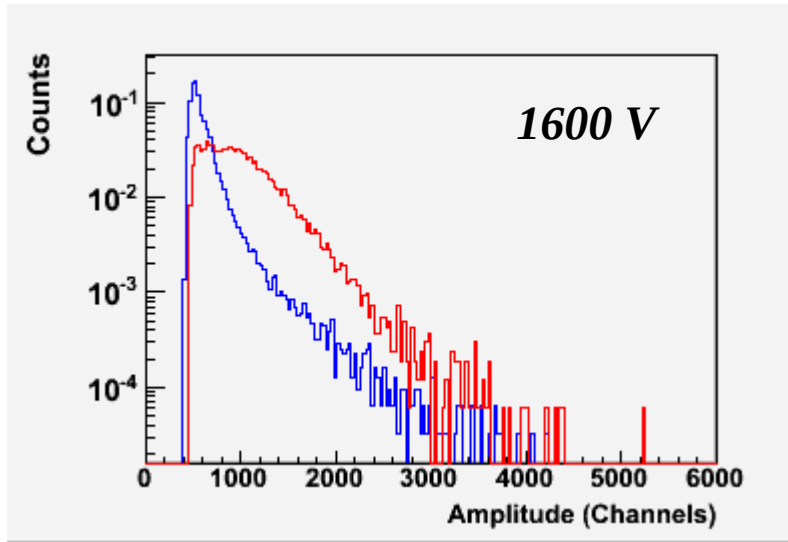
5 GeV/c momentum



# Pulse height distribution for electrons and pions

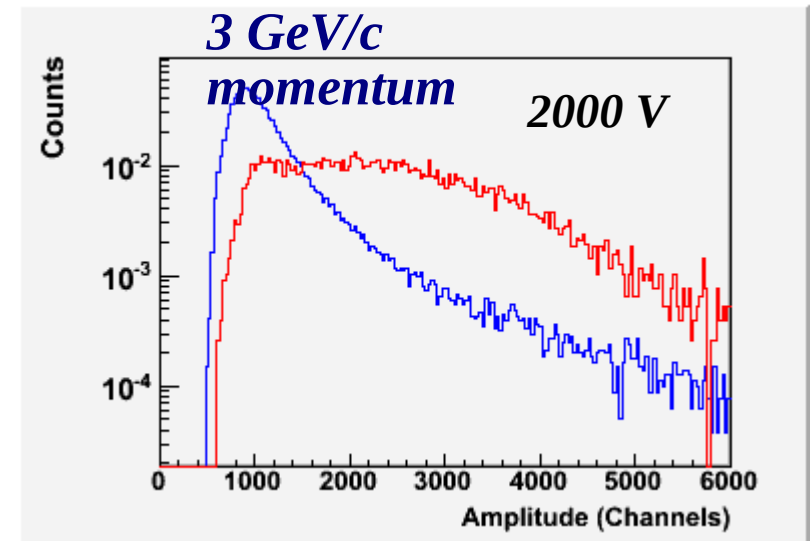
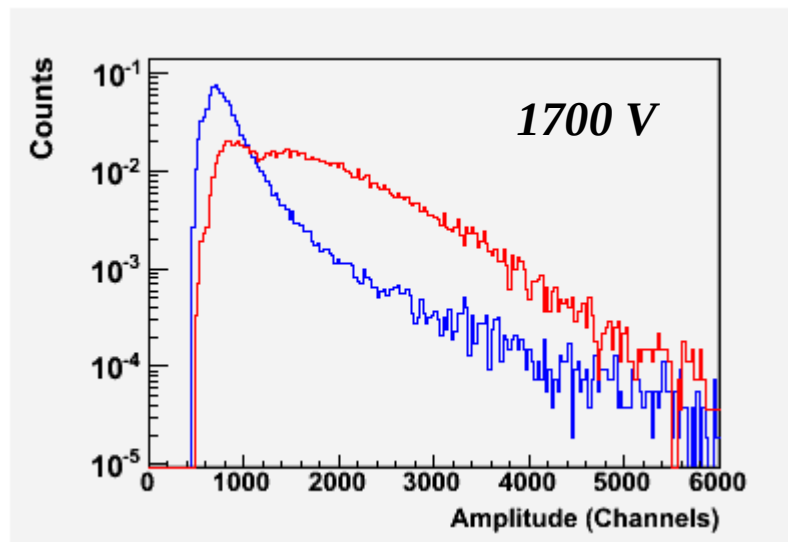
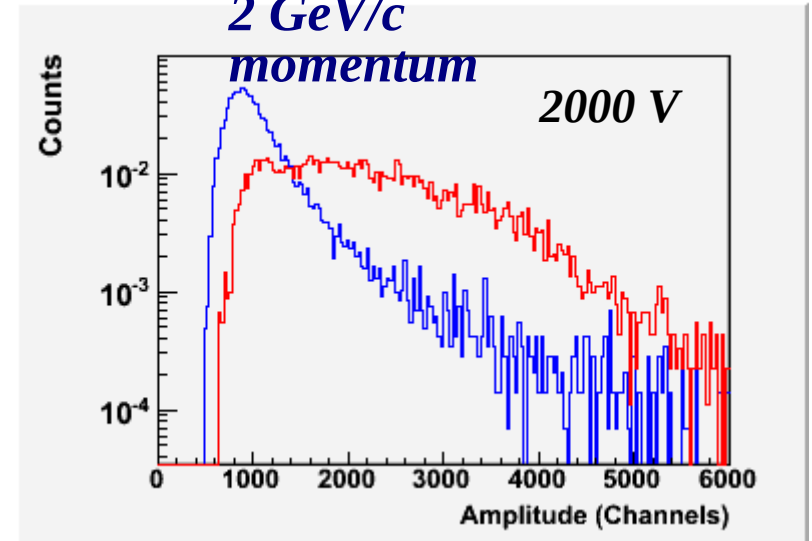
**TRD1 4 gaps x 3 mm,  
radiator: Reg2 (20/250/220)**

**2 GeV/c momentum**



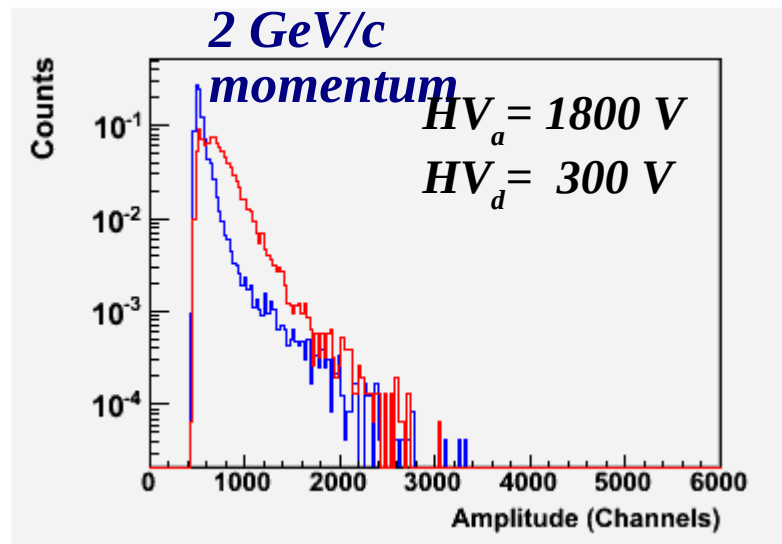
**Gas mixture:  
80%Xe+20%CO<sub>2</sub>**

**TRD2 4 gaps x 4 mm,  
radiator: Reg1 (20/500/120)  
2 GeV/c**



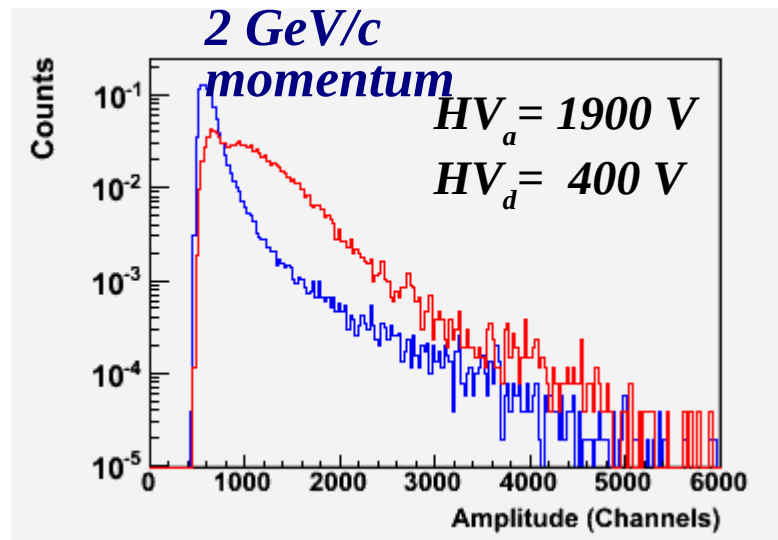
# Pulse height distribution for electrons and pions

*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*

*Madalina Tarzila, Valerica Aprodu, Daniel Bartos, Alexandru Bercuci, Vasile Catanescu, Florin Constantin, Gheorghe Caragheorgheopol, Mariana Petris, Mihai Petrovici, Lucia Prodan, Andrei Radu, Laura Radulescu, Victor Simion, Petre Zaharia*

*2<sup>nd</sup> 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*

*20<sup>th</sup> CBM Collaboration Meeting, Kolkata, 24 - 28 September, 2012, India,*