19.06.2004 Meeting

~ 1 Year from our first Meeting !

Do we have reasons for an Anniversary

Did we follow the basic principles for

A New Type of Organization

and not for

One More Organization?

- **excellence**
- **international lobby and support**
- **outreach**

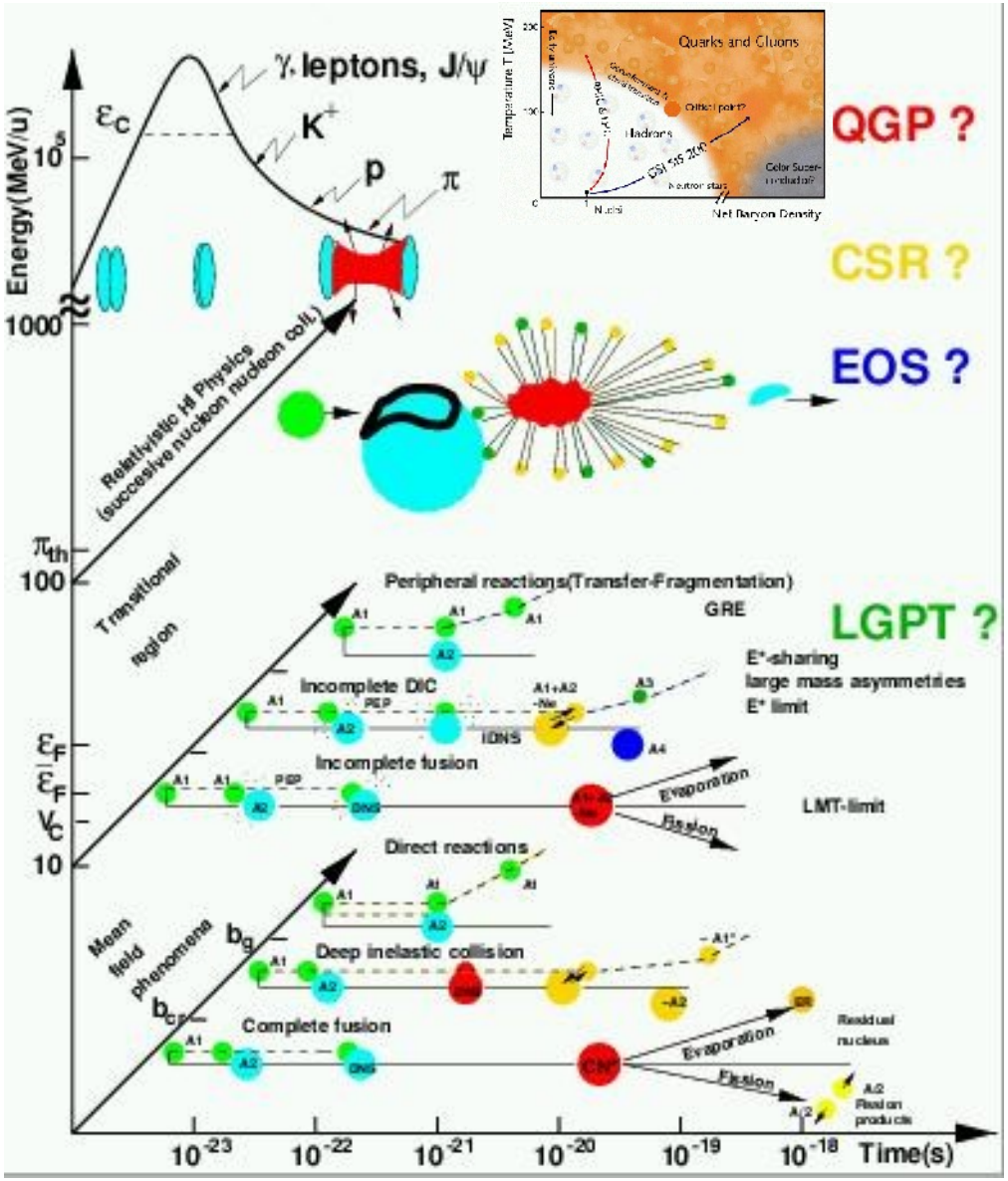
A EU Corner in a NON-EU Country

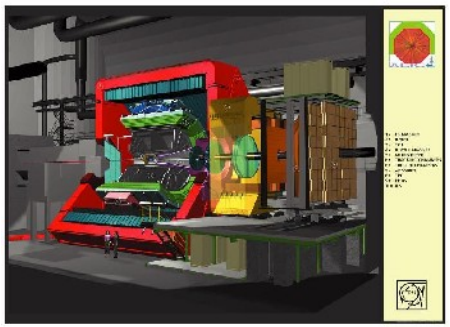
A European Corner in a NON-European Country

NATIONAL CENTRE OF EXCELLENCE

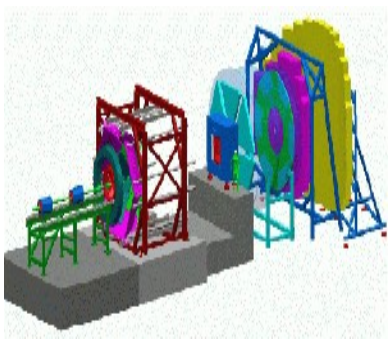
NUCEAR INTERACTIONS AND HADRONIC MATTER

Field Overview & Contributions

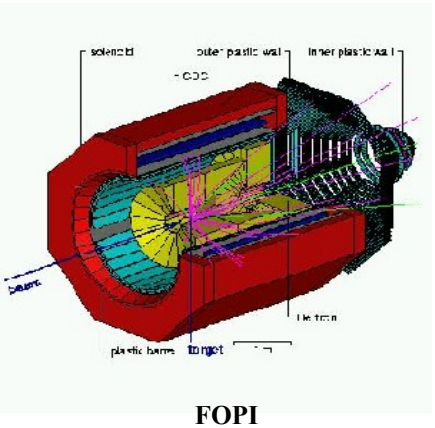




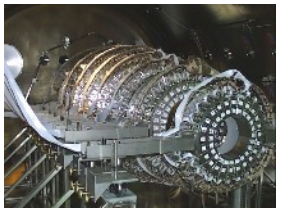
ALICE



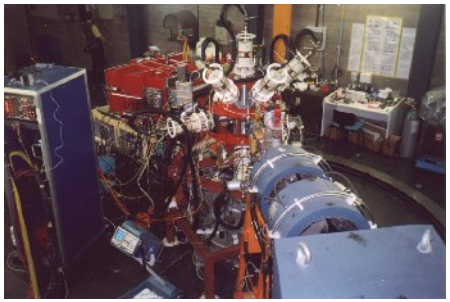
CBM



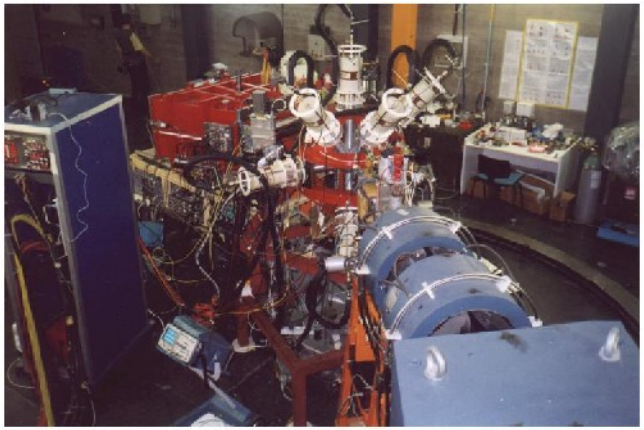
FOPI

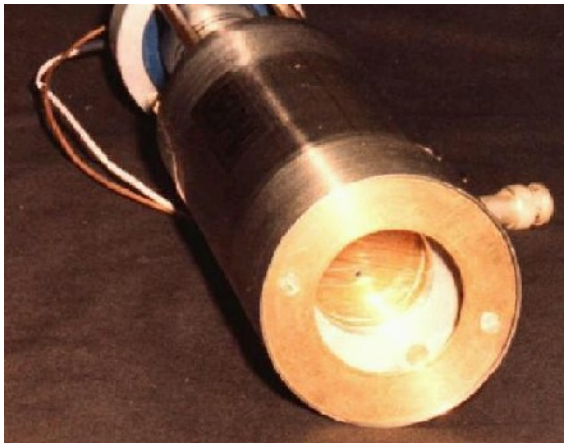


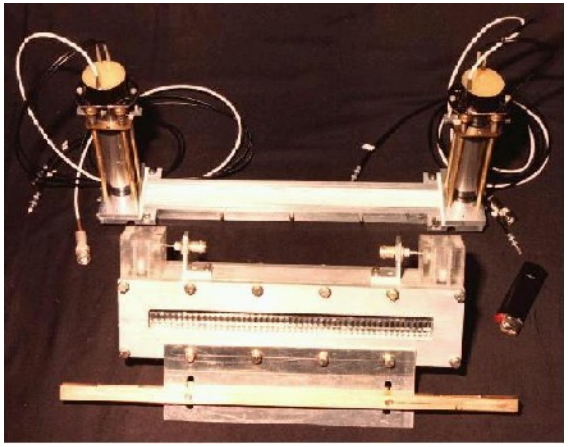
CHIMERA



DRACULA

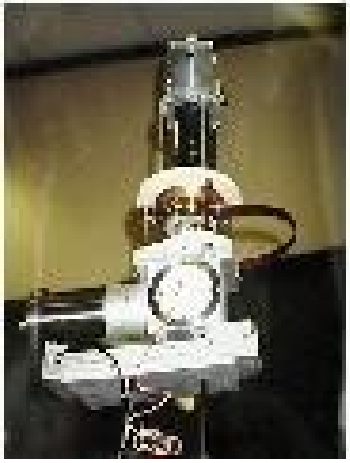






Large area, twin PPAD - Stop

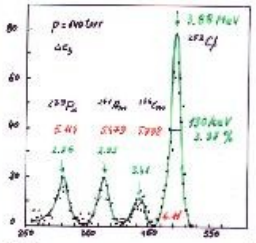
4 times segmented PPAD - Start

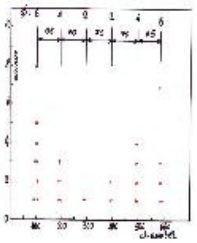


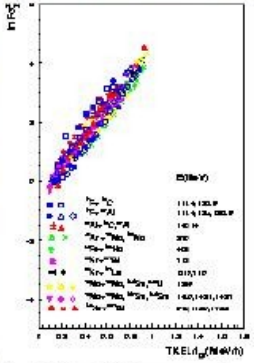
in beam - Start counter

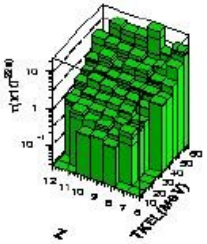
thin plastic scintillator + ellipsoidal mirror

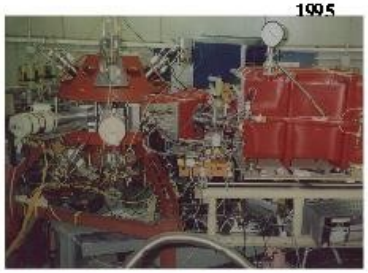
Results

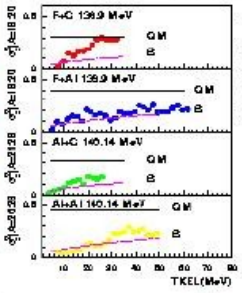


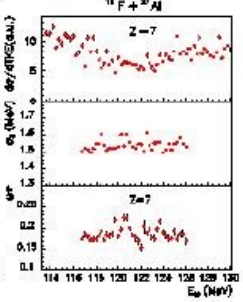




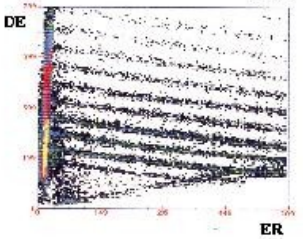


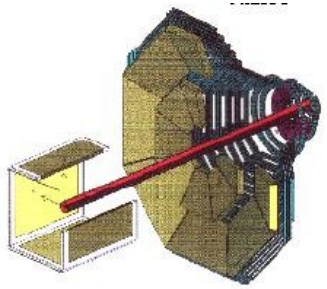


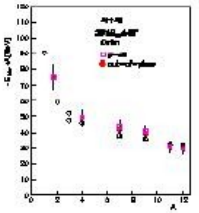


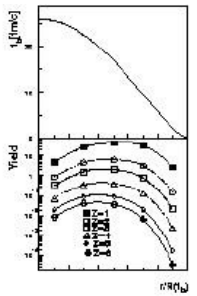


$$\frac{\sigma_1}{\sigma_2} = \frac{2S_1+1}{2S_2+1} e^{-\frac{\Delta E}{T}}$$

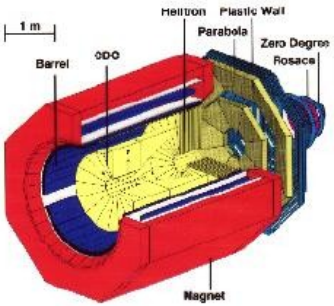


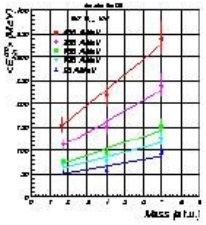


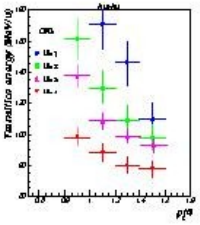


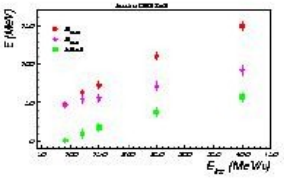


Phase II

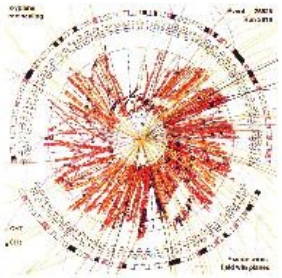


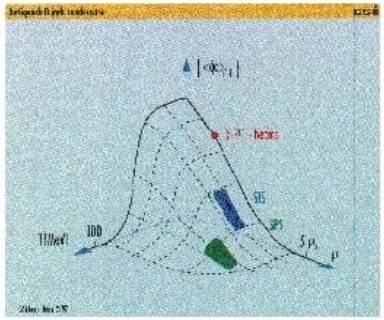






Phase III



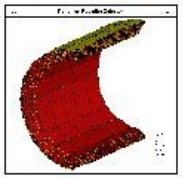


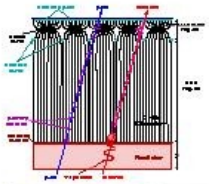
DRACULA COLLABORATION

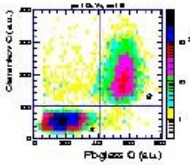
FOPI COLLABORATION

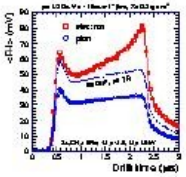
R&D Results

Detectors

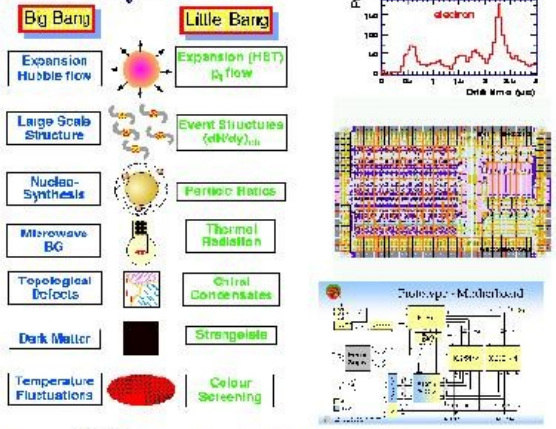


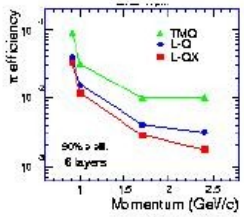




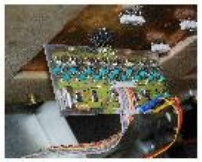


Physics

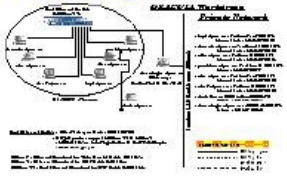




Electronics



Computing



Romania in ALICE

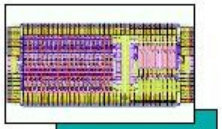
Layout of the ALICE detector.

ALICE (A Large Ion Collider Experiment) is an experiment at the Large Hadron Collider (LHC) optimized to study new states of matter created in heavy-ion collisions at 5.5 TeV centre-of-mass energy per nucleon. ALICE aims to study the properties of hot Quark-Gluon Plasma (QGP), and phenomena which took place just after the Big-Bang, in the early Universe. To achieve this goal, ALICE, as the only dedicated heavy-ion experiment at the LHC, is designed to measure a large set of observables over as much of phase space as achievable and thereby covering hadronic and leptonic observables as well as photons.

Since 1999 a Romanian team of 14 people from NIPNE (Bucharest) under the leadership of Dr. Mihai Petrovici has been a member of the ALICE Collaboration.

This group is involved in the R&D activities related to the Transition Radiation Detector (TRD) and should start the production of various parts of this detector (20% in total) in Bucharest.

One sample of the TRD geometry.



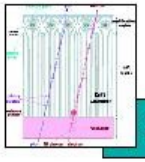
Pre-amplifier/shaper chip design in 0.35 micron technology.

The chief goal of the TRD is to provide electron identification in the central barrel at momenta in excess of 1 GeV/c where the pion rejection via energy loss measurement in the TPC is no longer sufficient. As a consequence, the TRD significantly expands the physics objectives of the ALICE experiment.

The prototype of a distributed computing system, as a testbed for a Tier-3 centre for the ALICE experiment in Bucharest.

The first front-end electronics prototype and experimental results.

Photograph of the beam test set-up.



A schematic illustration of the TRD principle.

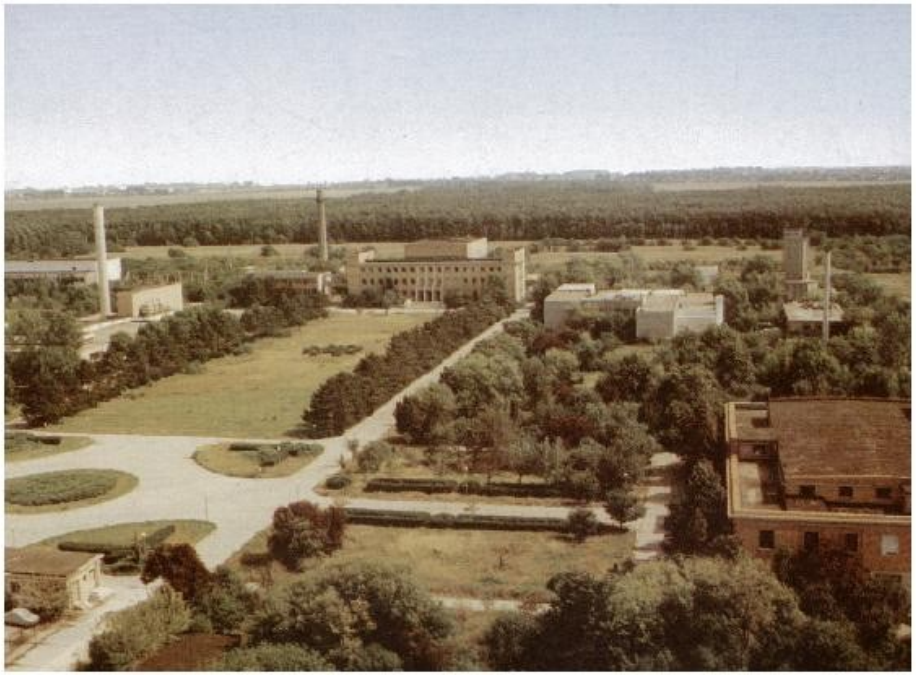
Science Bringing Nations Together

Science Bringing Nations Together

Science Bringing Nations Together

Science Bringing Nations Together

LOCATION



NIPNE

DETLAB

Manpower

- 13 physicists - <age> = 48 years
- 2 mathematicians - <age> = 46 years
- 7 engineers - <age> = 58 years
- 1 subengineer - <age> = 53 years
- 7 technicians - <age> = 55 years
- 7 students - <age> = 22 years

OTHER FINANCIAL RESOURSES

- 4 Projects within CERES national program
- 1 Project within INFOSOC national program
- National Centre of Exellence
  "Nuclear Interactions and Hadronic Matter"
- 3 JRA projects within 3IHP-FP6

Detlab_Nov_2003_March_2004













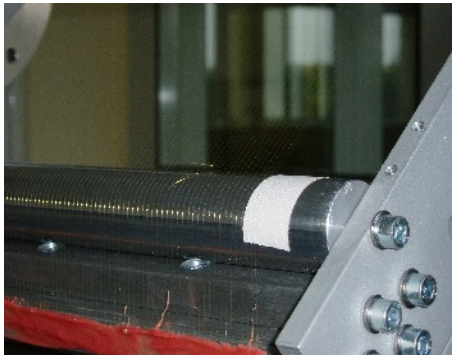



DetLab_April_May_2004












ALICE TRD

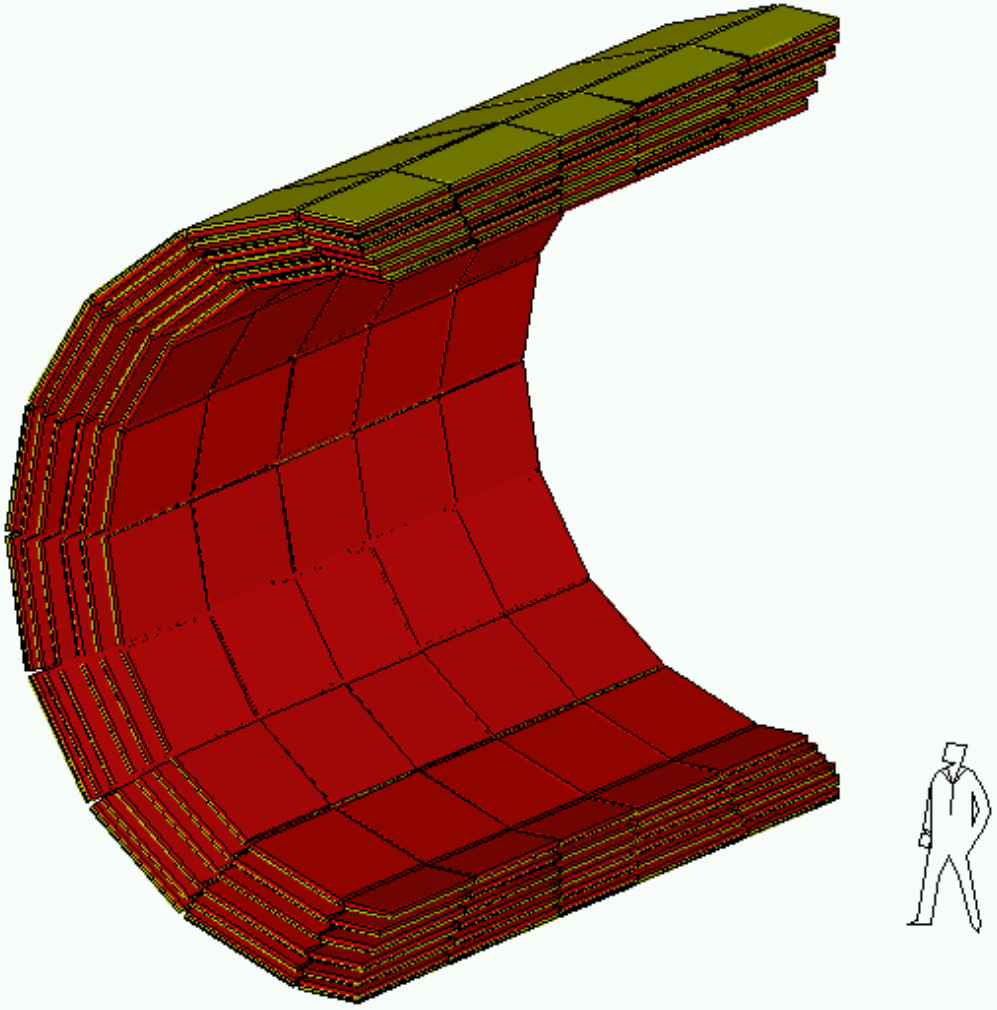
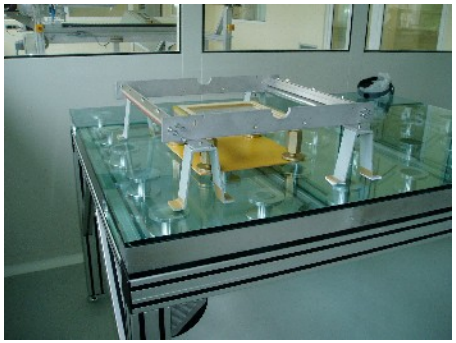
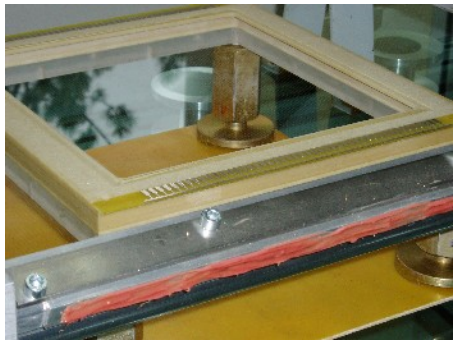
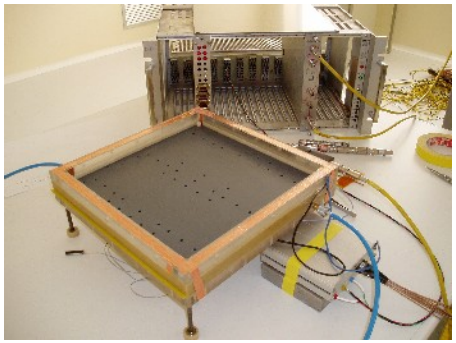


Table 1: Synopsis of TRD parameters.

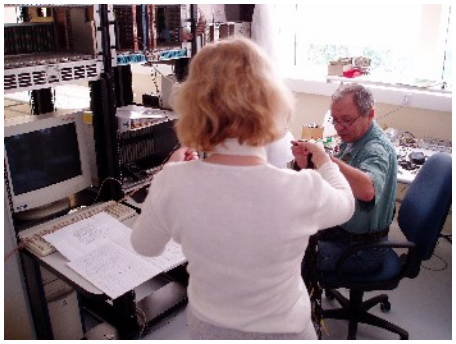
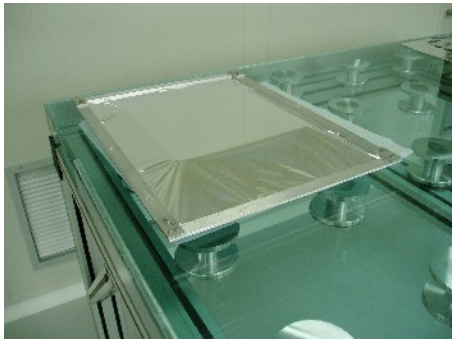
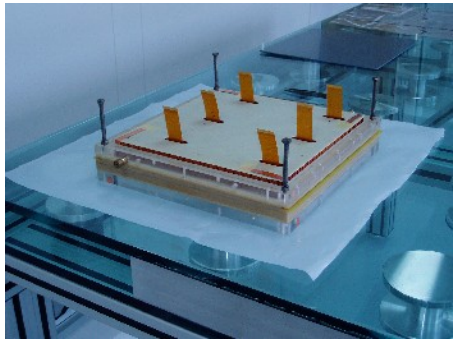
Pseudorapidity coverage	$-0.9 < \eta < 0.9$
Azimuthal coverage	2π
Radial position	$2.9 < r < 3.7$ m
Length	maximal 7.0 m
Segmentation in φ	18–fold
Segmentation in radius	6 layers
Segmentation in z	5–fold
Total number of modules	540
Largest module	120×159 cm^2
Detector active area	736 m^2
Detector thickness radially	$X/X_0 = 14.3\%$
Radiator	fibres/foam sandwich, 4.8 cm per layer
Module segmentation in φ	144
Module segmentation in z	12–16
Typical pad geometry	$0.725 \times 8.75 = 6.34$ cm^2
Time samples in r (drift)	15
Number of readout channels	$1.16 \cdot 10^6$
Number of readout pixels	$1.74 \cdot 10^7$
Detector gas	Xe,CO_2 (15%)
Gas volume	27.2 m^3
Depth of drift region	3 cm
Depth of amplification region	0.7 cm
Nominal magnetic field	0.4 T
Drift field	0.7 kV/cm
Drift velocity	1.5 cm/μs
Diffusion, longitudinal	$D_L = 250\ \mu m/\sqrt{cm}$
Diffusion, transversal	$D_T = 180\ \mu m/\sqrt{cm}$
Lorentz angle	8°
Occupancy (for full multiplicity)	34%
Typical space point resolution at 1 GeV/c	
in $r\varphi$	400(600) μm for low (high) multiplicity
in z	2.3 cm (without tilt)
Momentum resolution	$\delta p/p = 2.5\% \oplus 0.5\%(0.8\%)p$ for low (high) multiplicity
Pion suppression at 90% electron efficiency and $p_t \geq 3$ GeV/c	better than 100

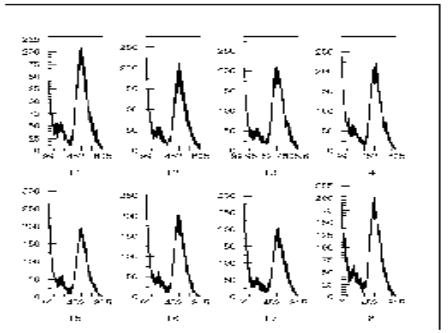
High counting rate TRD

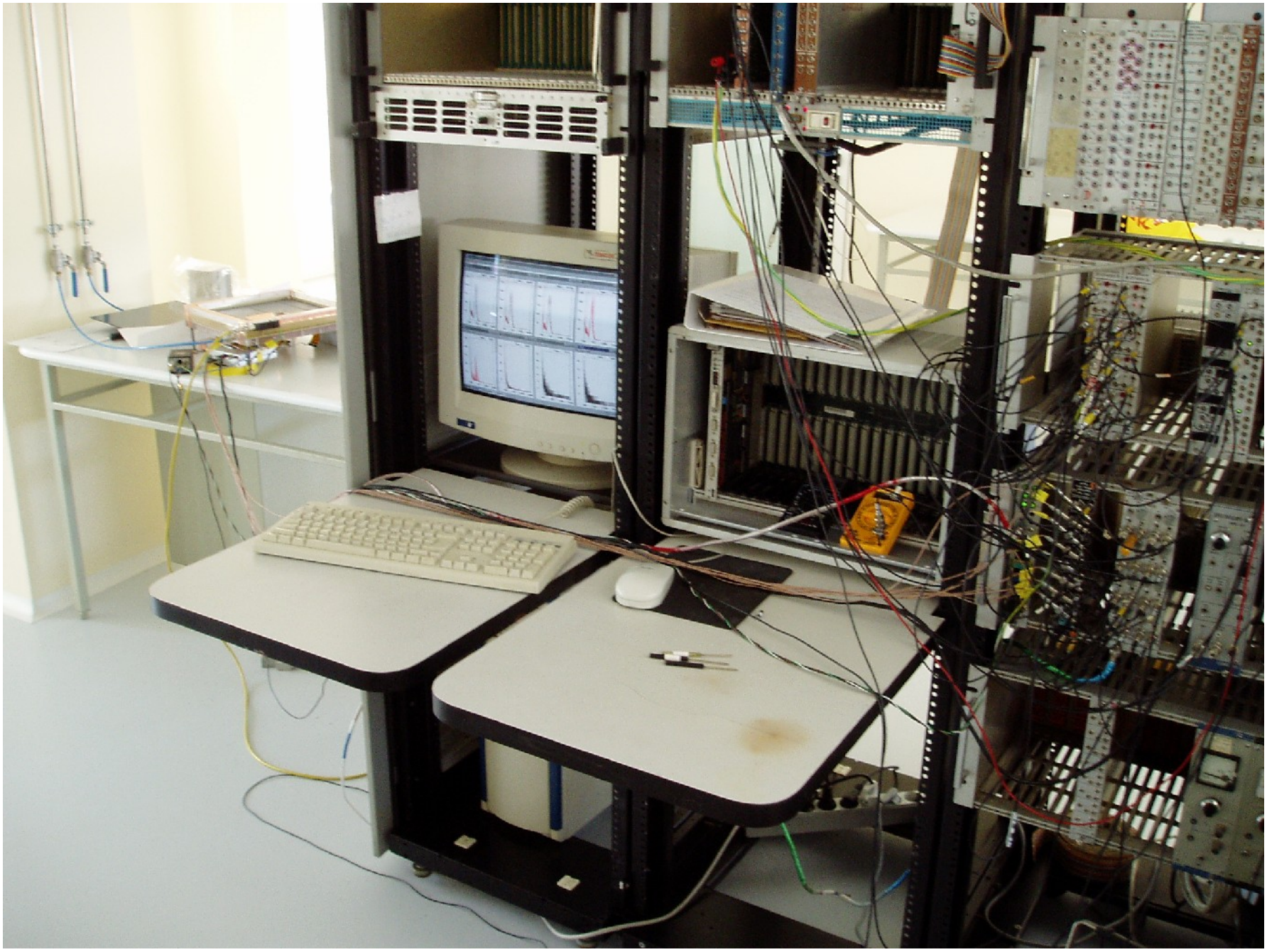



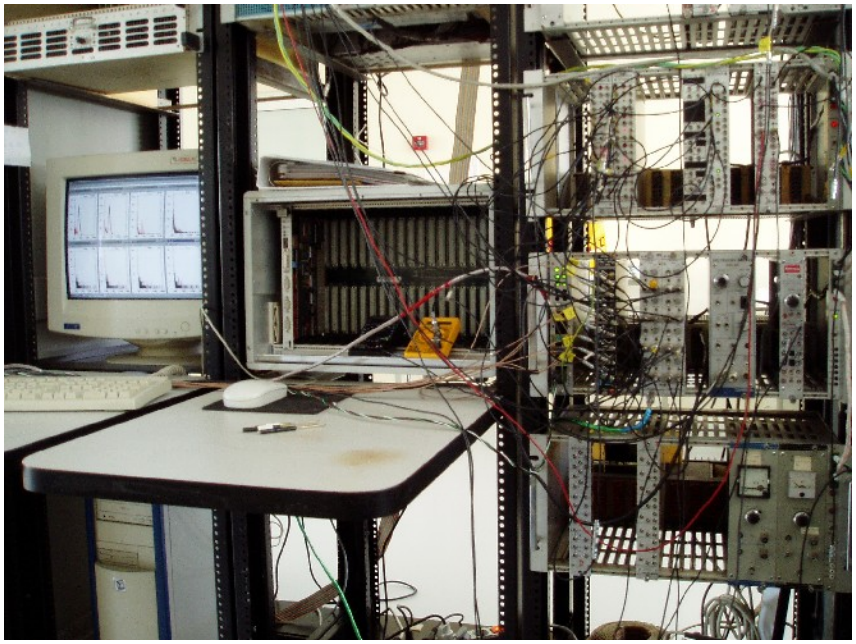


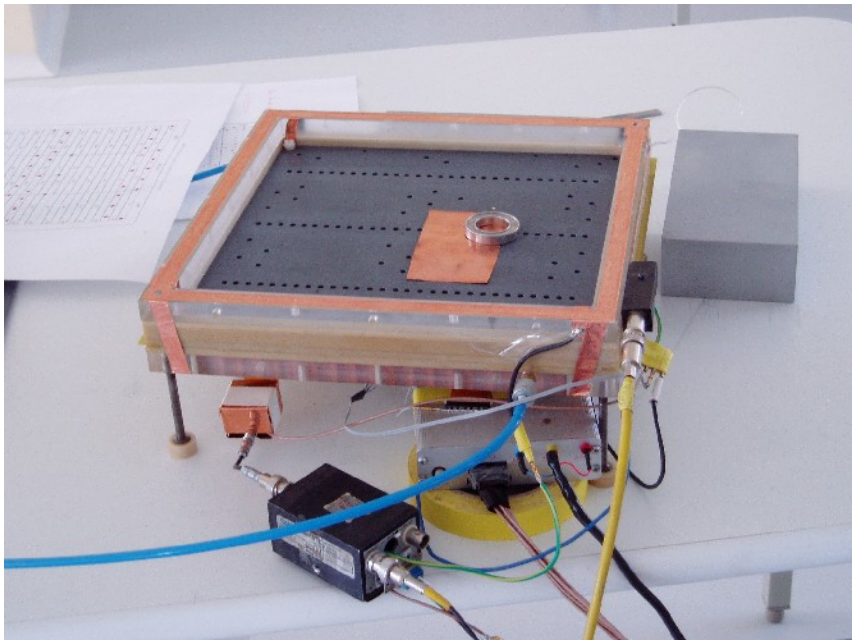


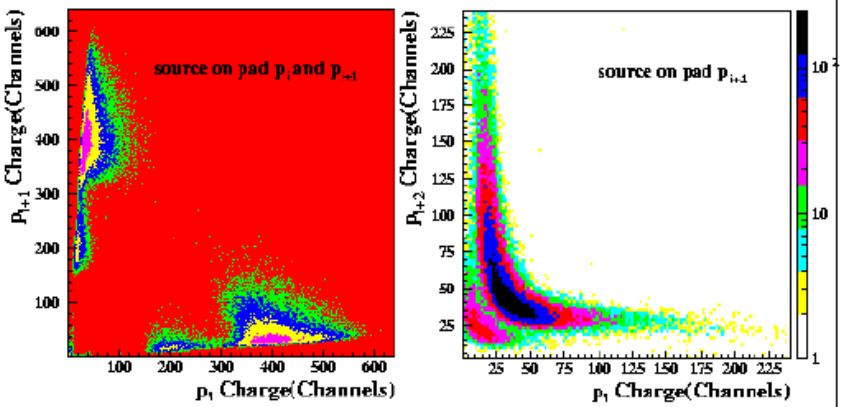


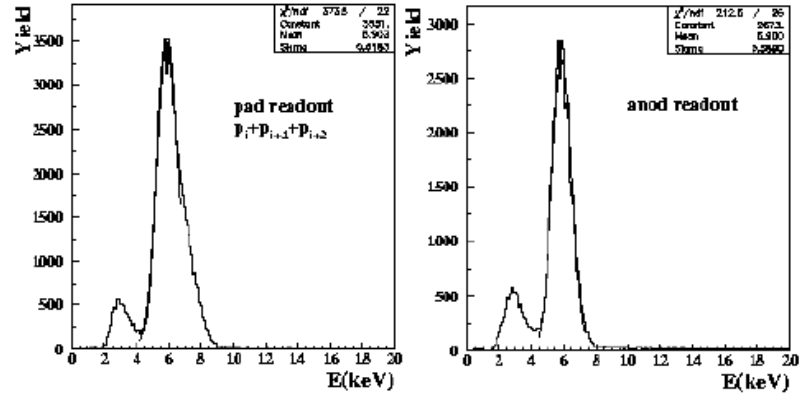


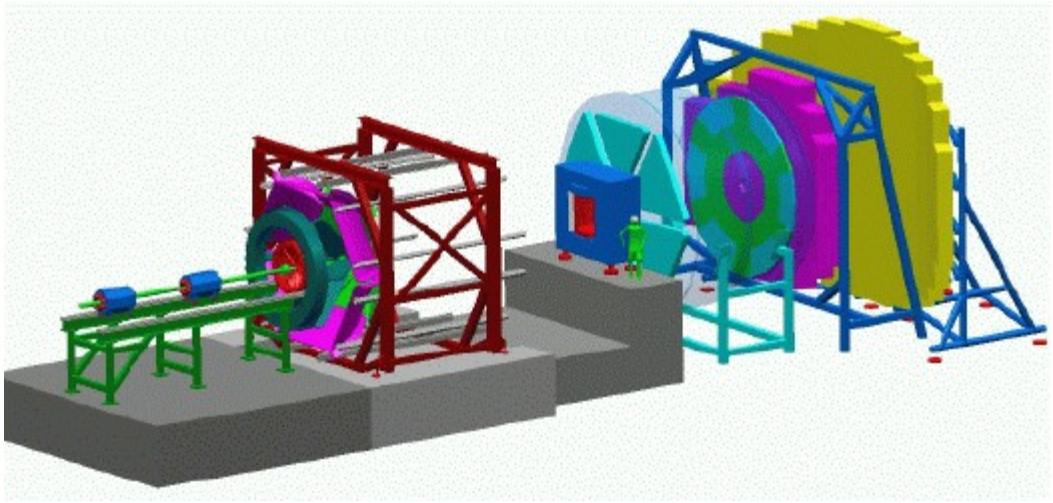




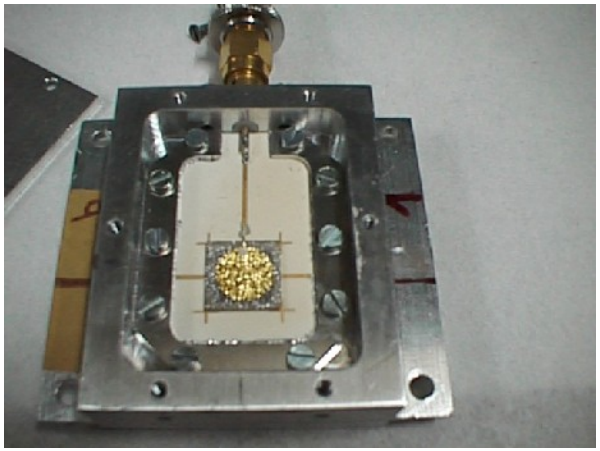
^{55}Fe source measurements
70% Ar + 30%CO_2



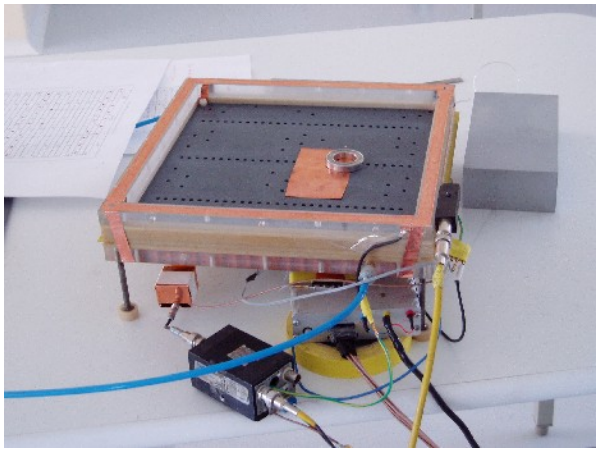




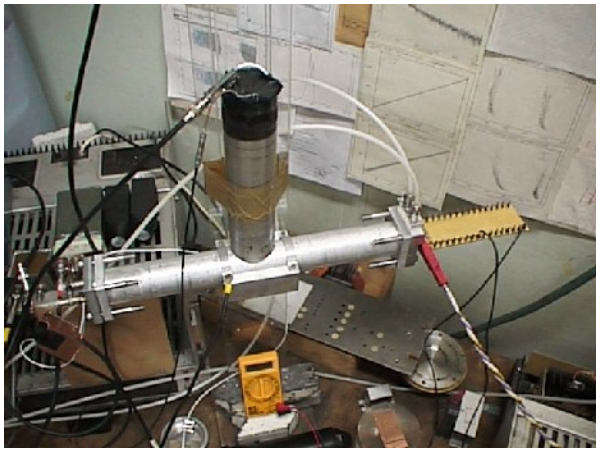
CBM



CVD - DD



HCR - TRD



RPC