# Gas Detectors Posters Review

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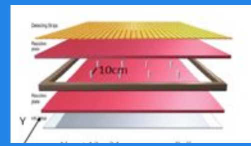
*18 POSTERS:*

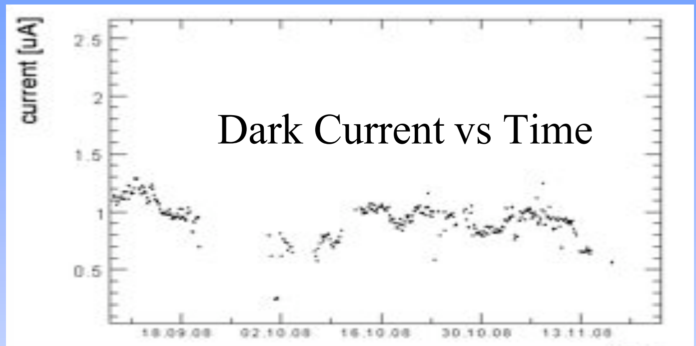
- *RPC: 6*
- *Drift Tubes, Straws, MWPC: 7*
- *Micropattern (GEM): 5*
- *Fundaments: 1*

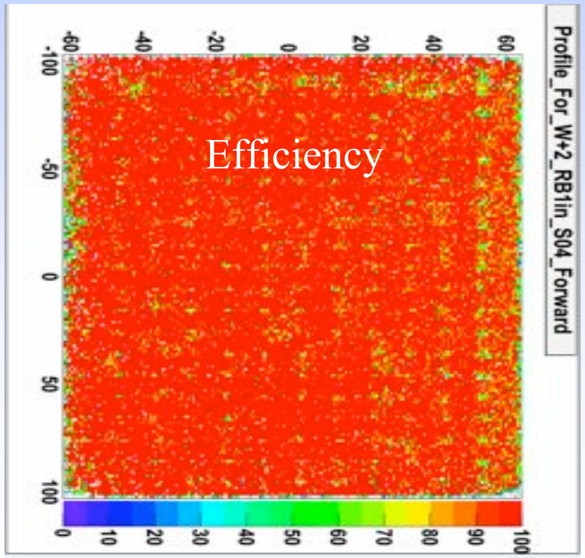
# *RPC SYSTEMS*

REMINDER: The very large number of modules used by the experiments require the development of automatic calibration, alignment and monitoring procedures.

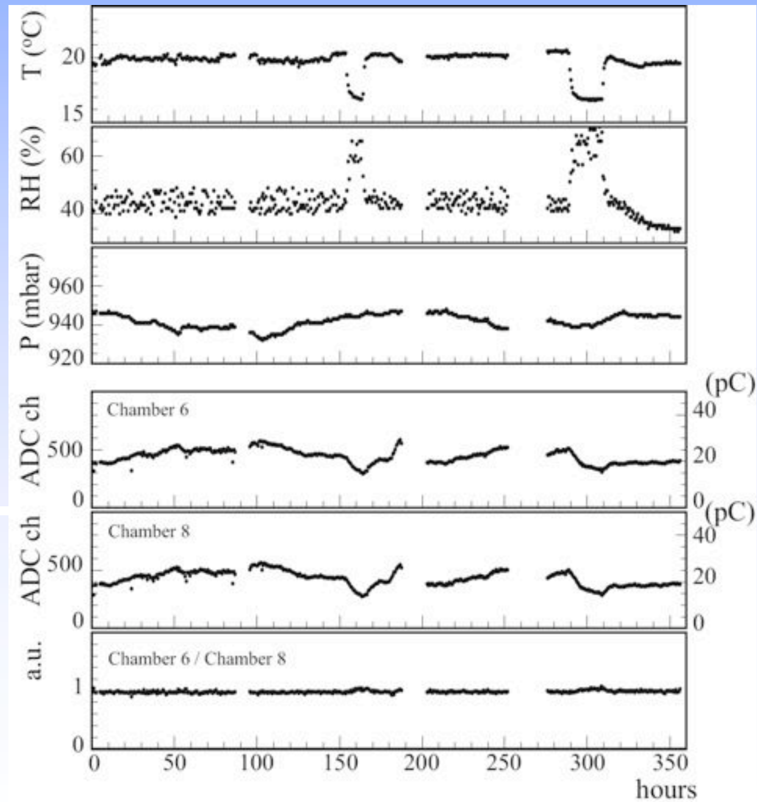


*Davide Piccolo: Resistive Plate Chambers Performances with Cosmic Rays in the CMS*




*Stefano Colafranceschi: Operational Experience of the Gas Gain Monitoring System for the CMS RPC muon detectors*

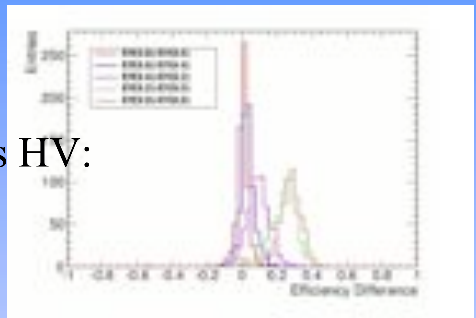


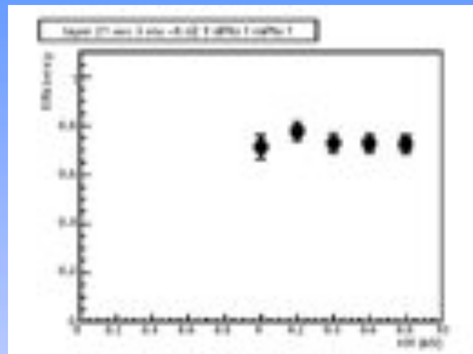
# RPC SYSTEMS

*<u>Giordano Cattani:</u> Large-Scale Performance Studies of the Resistive Plate Chambers Fast Tracker for the ATLAS 1st-Level Muon Trigger*

Efficiency vs HV:

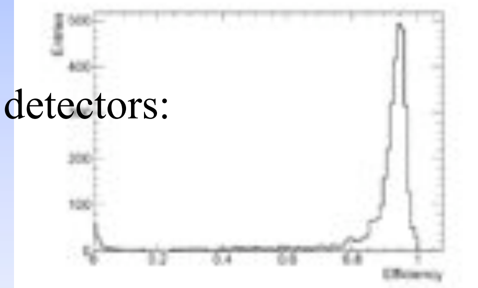
Efficiency spread vs HV:

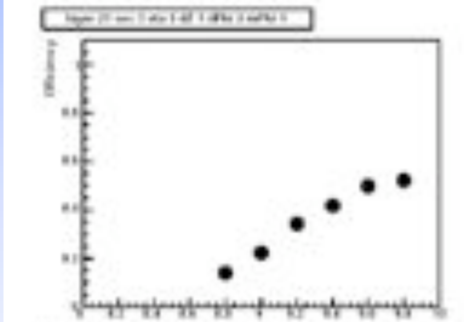




1.9%
DCS mapping errors

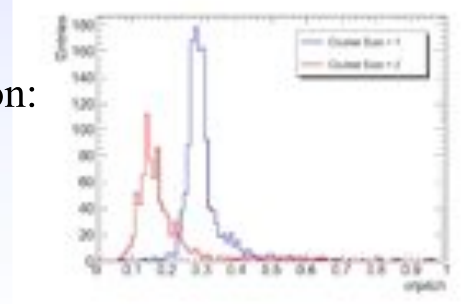
Mean efficiency, all detectors:

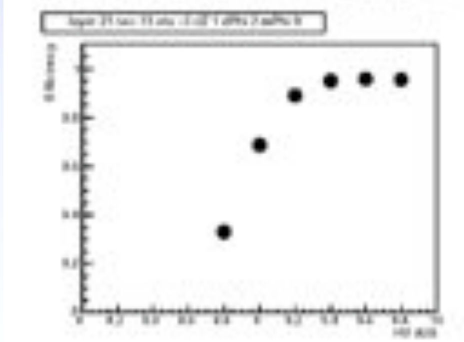




2.3%
Under investigation

Resolution:



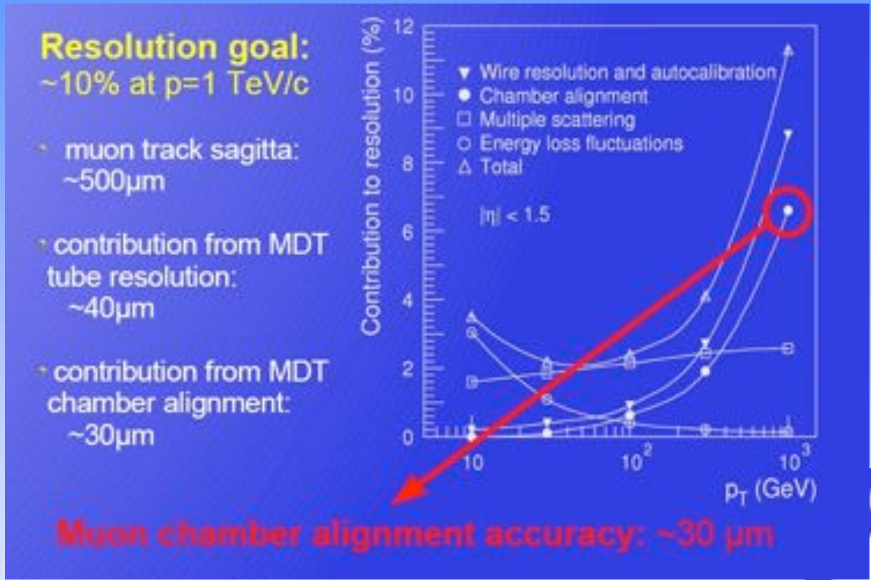


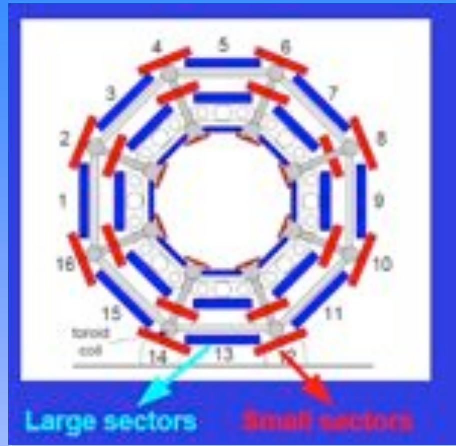
Normal

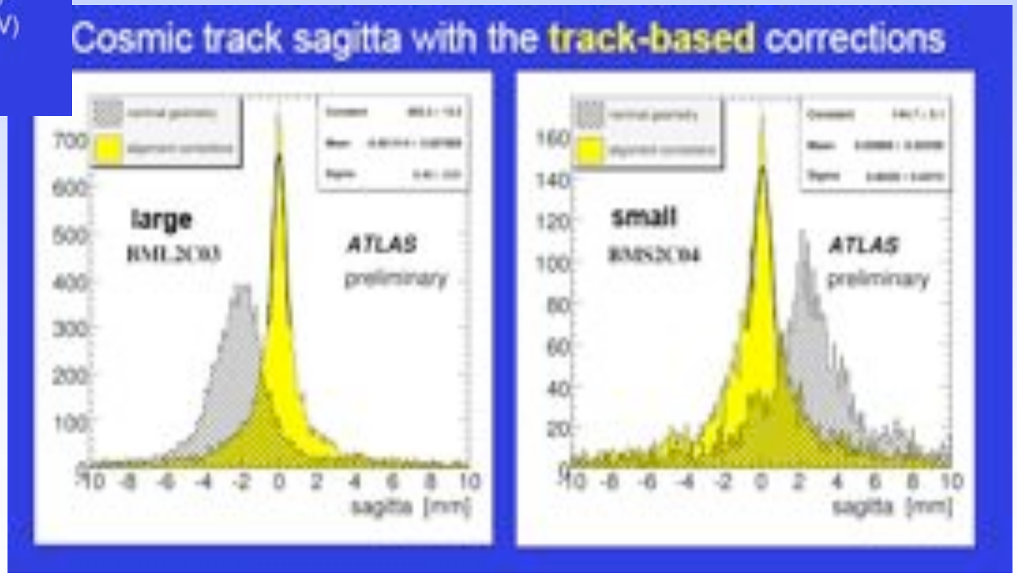
# *WIRE SYSTEMS*

*<u>Igor Potrap</u>: Alignment of the ATLAS Muon Spectrometer with Tracks*

Monitored Drift Tubes (MDT)



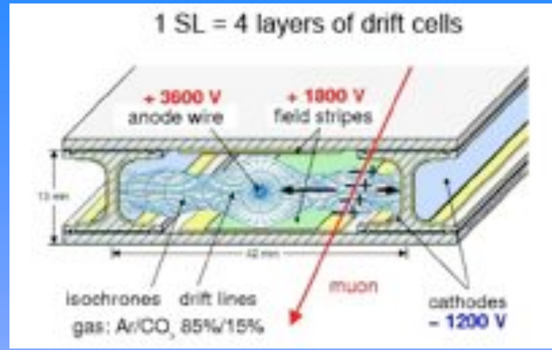



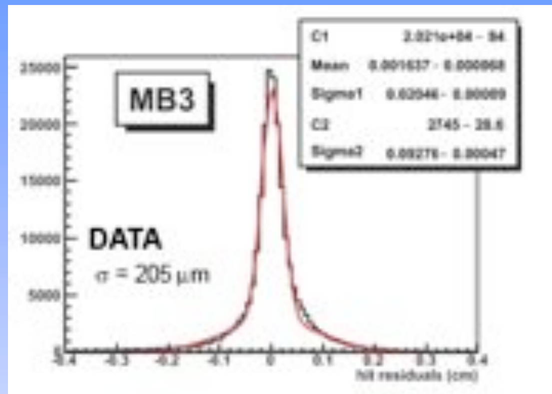
# *WIRE SYSTEMS*

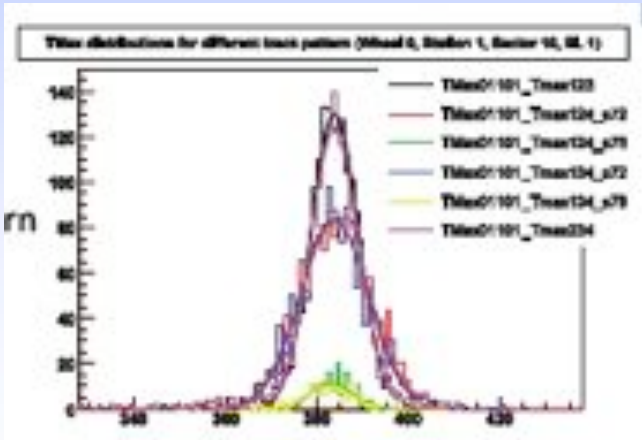
*Giorgia Mila: Calibration of the Barrel Muon Drift Tube Chambers*

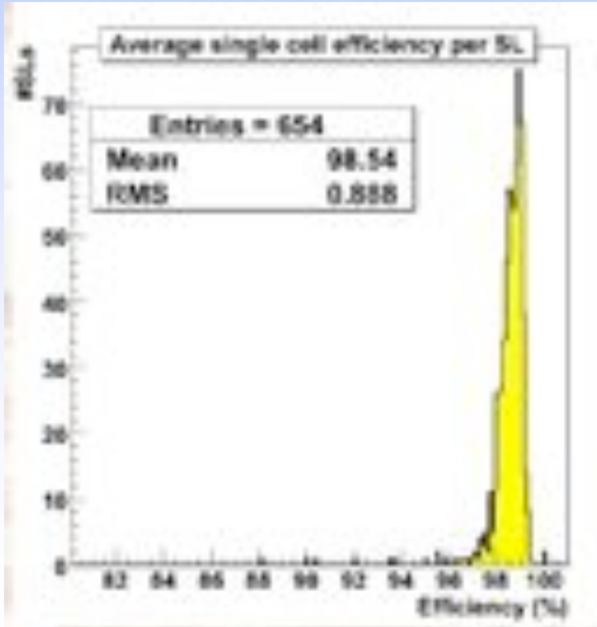
*Gianluca Cerminara: Commissioning, Operation and Performance of the CMS Drift Tube Chambers*







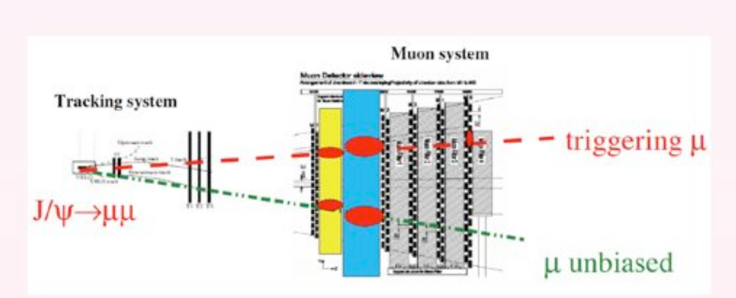



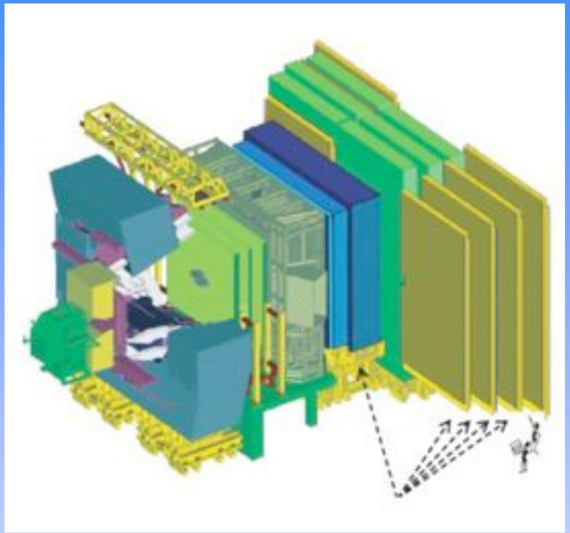


## *HYBRID SYSTEMS*

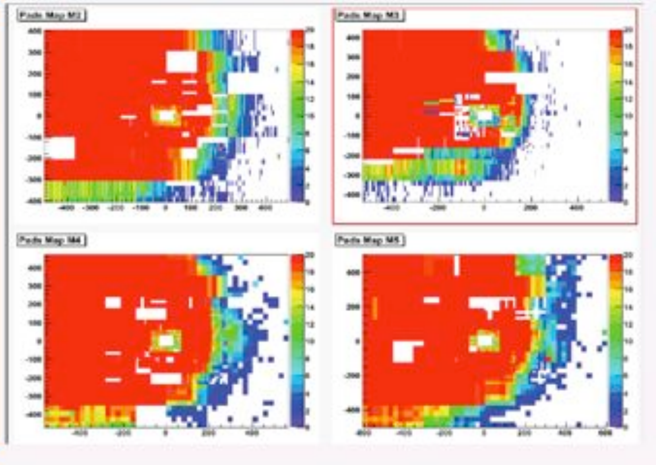
*Sara Furcas: The LHCb Muon detector commissioning and first running scenario*

1368 MWPC + 24 Triple-GEM



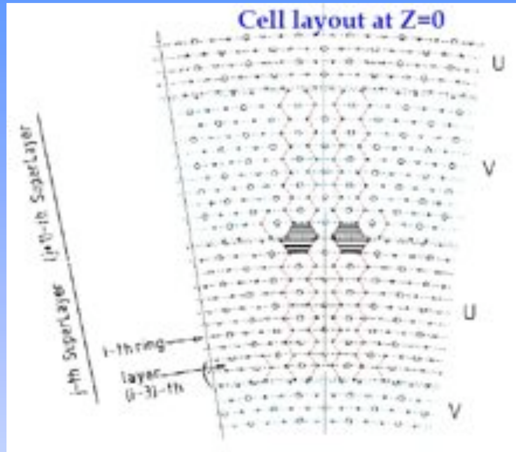
Data monitoring has been tested on beam 1 evts: holes (dead channels) have been fixed during shutdown (<0.5% channels remain to be fixed)



## *NEW CONCEPTS*

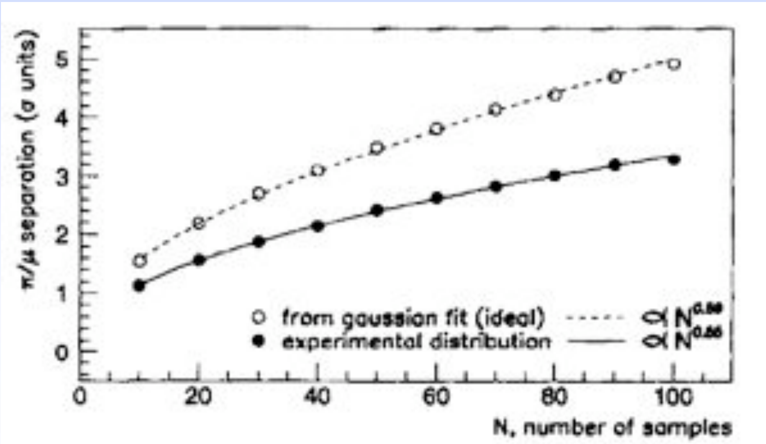
*<u>Anna Mazzacane</u>: The 4th Concept Detector for the ILC*

*<u>Giovanni Tassielli</u>: Cluster Counting Drift Chamber as High Precision Tracker for ILC Experiments*




Tracker: classic multi-cell Drift Chamber with very light construction using carbon fibre walls and aluminum cathode wires (~ 0.4 % $X_0$ for $90^0$ tracks), and helium-based gas mixture.

Particle identification by Cluster Counting
*G. Cataldi et al, NIMA 386(1997)458*

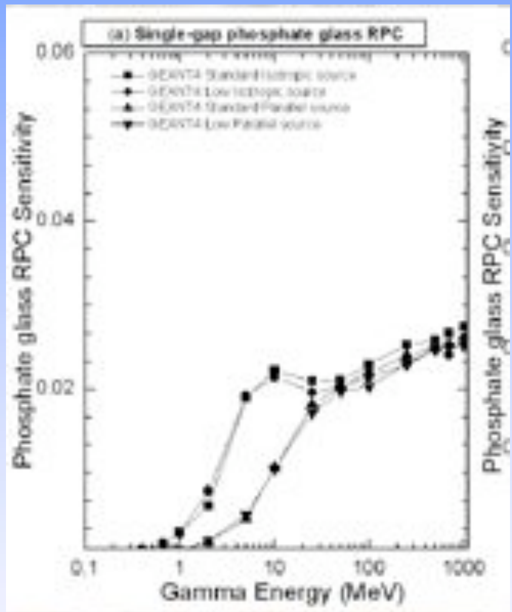



COMMENT: The cluster counting method for improving dE/dx resolution has been around since many years with mild success. The problems are:
- Light gases are needed to spatially separate the clusters, but their larger electron diffusion tends to scramble the clusters
- Single electron detection is needed (large gains)

# *RPCs - PRINCIPLES*

REMINDER: The choice of the electrode material in RPCs affects their operating properties:
High resistivity -> High gains, Low rate capability (and vice-versa)

*<u>June-Tak Rhee</u>: Simulation Study of Low-Resistivity Phosphate Glass Electrode RPC Gamma-Ray Sensitivity Using GEANT4 MC*

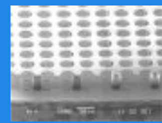



COMMENT: Conductivity in most glasses is due to ions migration, and modify the electrical characteristics with time (see the MSGCs experience!)

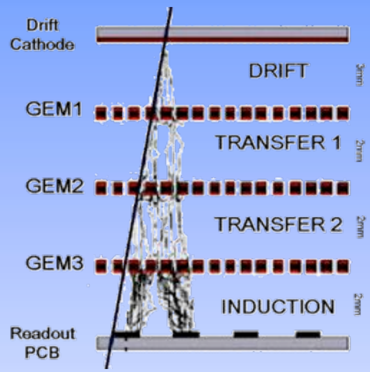
*<u>Saikat Biswas</u>: Study of timing Properties of Single Gap High-Resistive Bakelite RPC*
Small size silicone-coated RPCs, operated in the streamer mode.

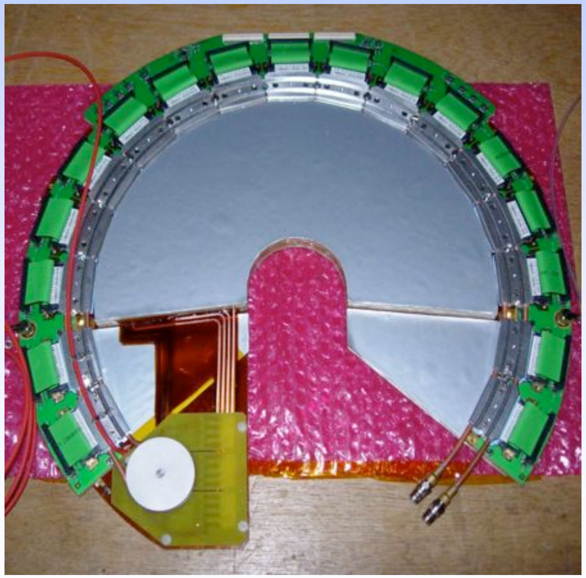
# MICRO PATTERN GAS DETECTORS

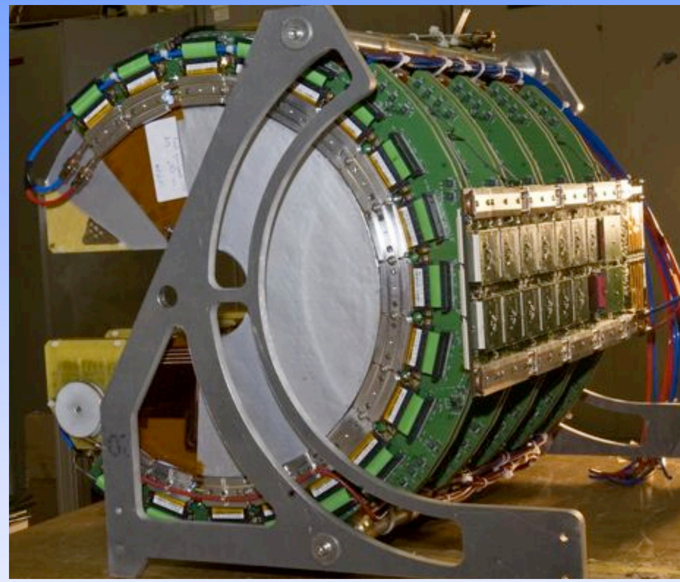
REMINDER: MPGDs have superior position accuracy, rate capability, radiation tolerance than wire-based detectors.



<u>*Maria Grazia Bagliesi*</u>*: The TOTEM T2 Telescope Based on Triple-GEM Chambers*



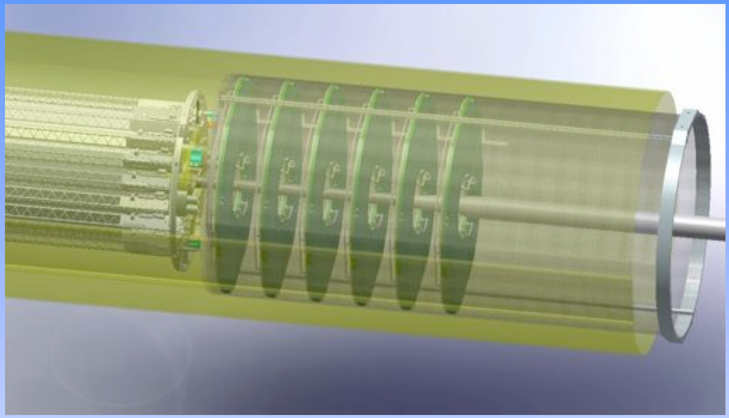



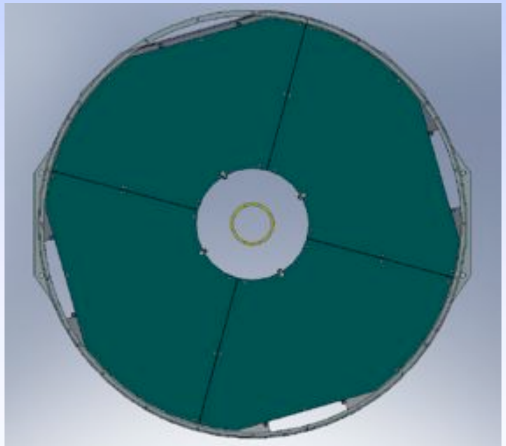


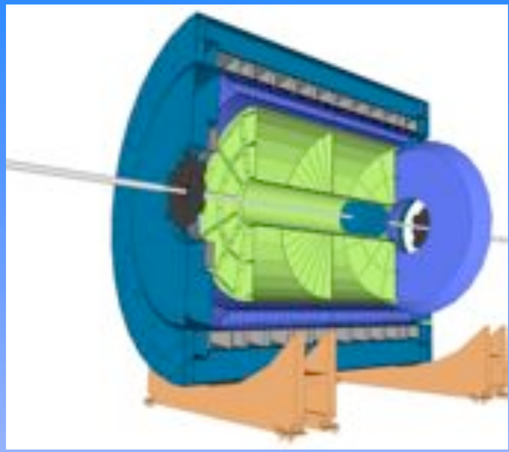
## GEM

*Bernd Surrow: The STAR Forward GEM Tracker*

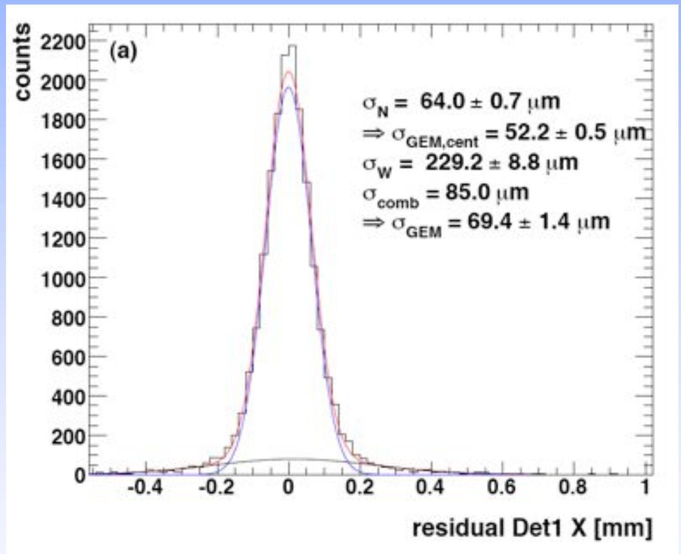
Triple-GEM detectors assembly.







Prototype test beam results:

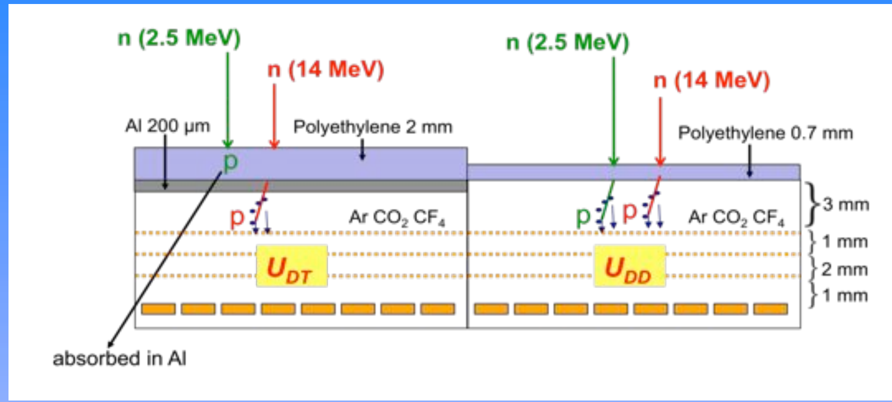


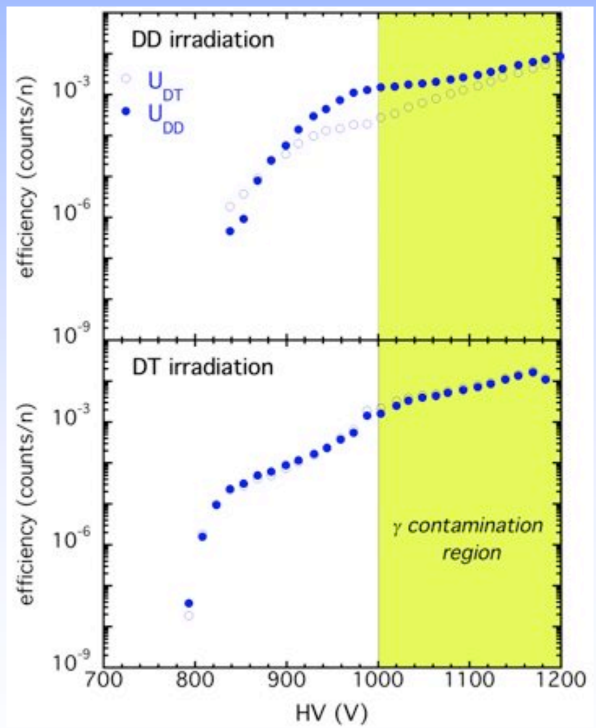

COMMENT: A major issue with the GEM technology is the quality control of the foils, industrially produced.

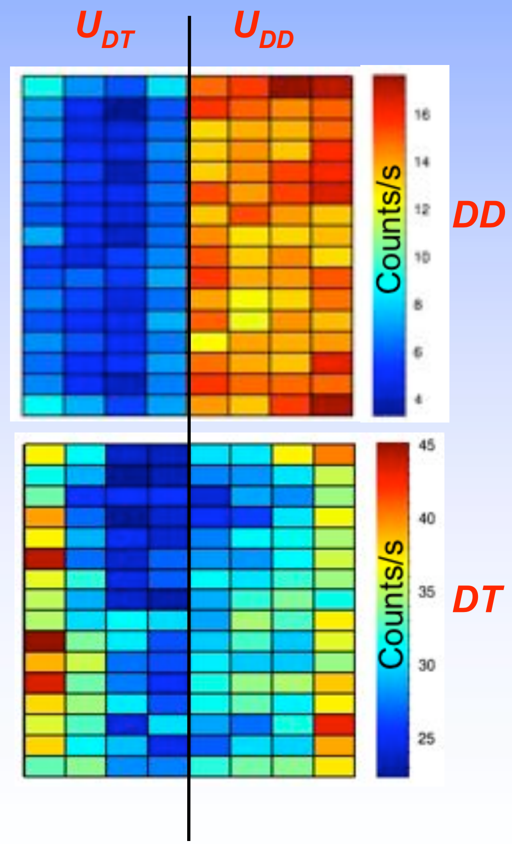
# MPGD - GEM

*Basilio Esposito: Design of a GEM-Based Detector for the Measurement of Fast Neutrons*

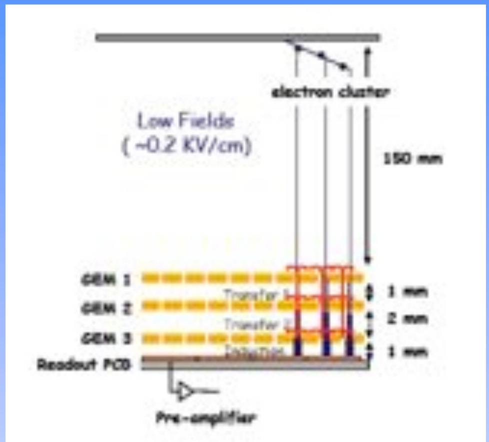
Triple-GEM detector with Polyethylene converters and pad readout; divided in two sections for 2.5 and 14 MeV n detection (DT), or 14 MeV only (DD).

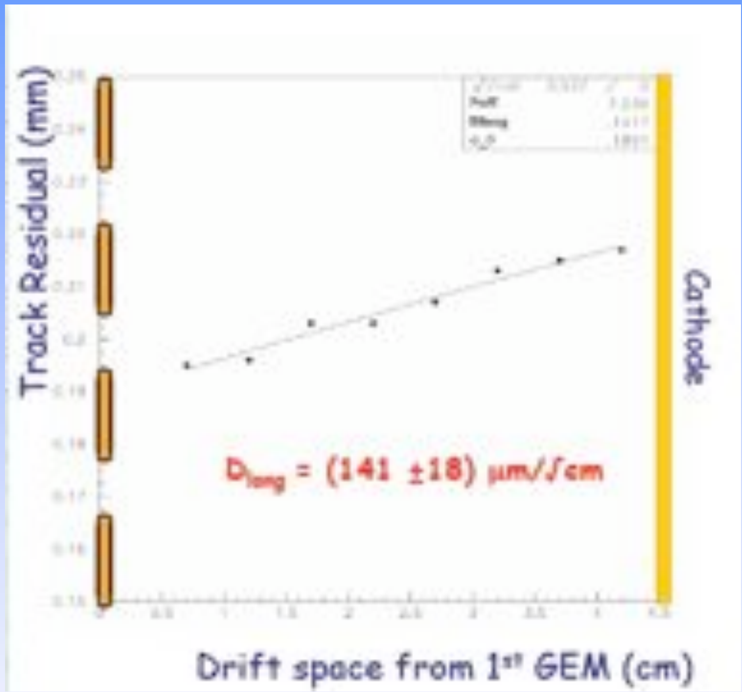


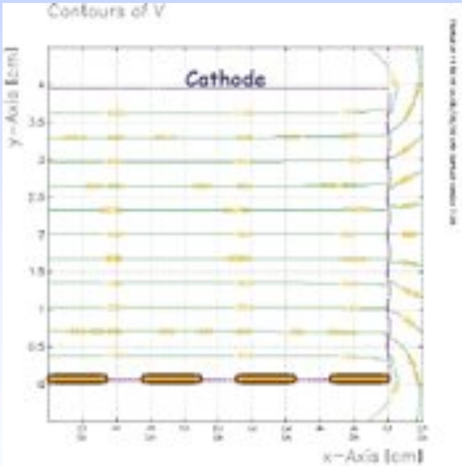



*Marco Poli Lener: Performances of a GEM-Based TPC Prototype for New High-Rate Particle Experiments*



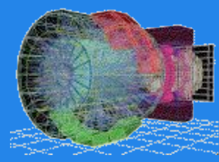



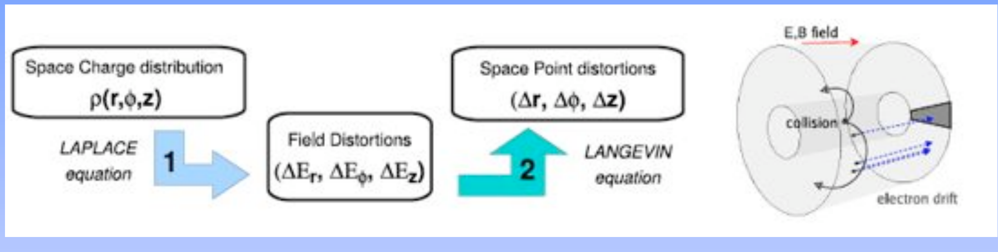

COMMENT: The main reason for using a GEM (or MICROMEGAS) End-Cap TPC Readout is the reduction of positive ion feedback, from ~ 20% (with MWPCs) to < $10^{-3}$

# FUNDAMENTS : SPACE CHARGE

REMINDER: Positive ions released by primary ionization or flowing back from multiplication modify the drift field and introduce distortions in tracks reconstruction.
RULE OF THUMB: For a gas gain of $10^4$, the ion backflow probability should be $<10^{-4}$.



Stefan Rossegger: *An analytical Approach to Space Charge Distortions for Time Projection Chambers*




ALICE TPC: ~ 3 kHz rate, 500 tracks/event, $T^+$~160 ms
PRIMARY IONIZATION ONLY!

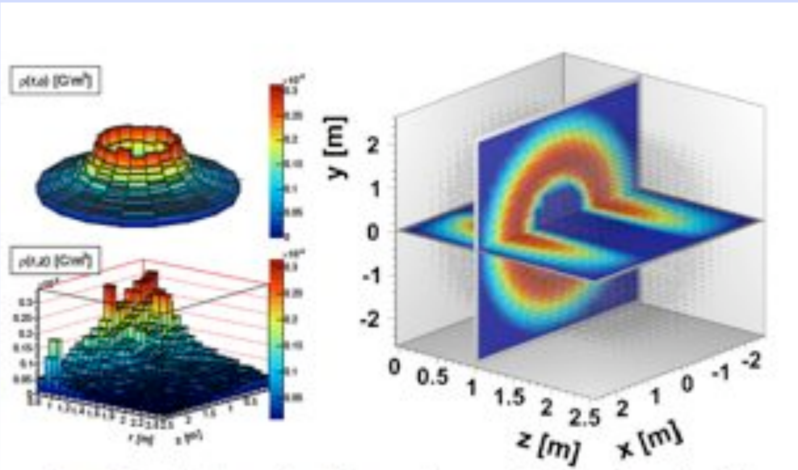
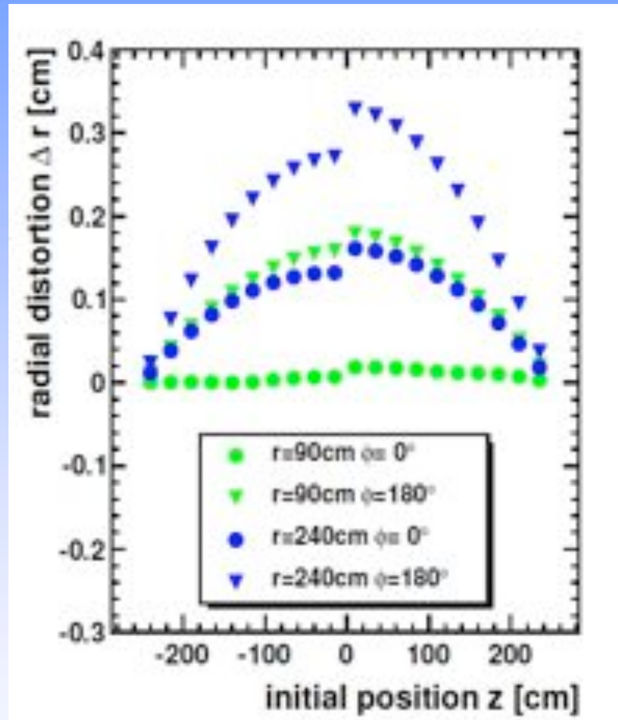



Figure: Expected scenario; left: space charges; right: resulting potential




COMMENT: Avalanche-induced ions backflow can be eliminated with gating (when possible) or reduced using MPGD readout.