Gas Detectors Posters Review

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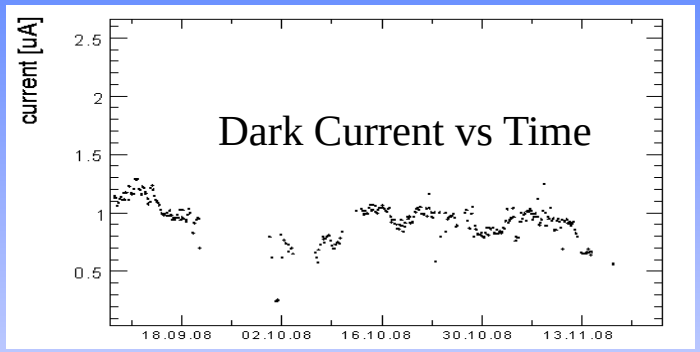
18 POSTERS:

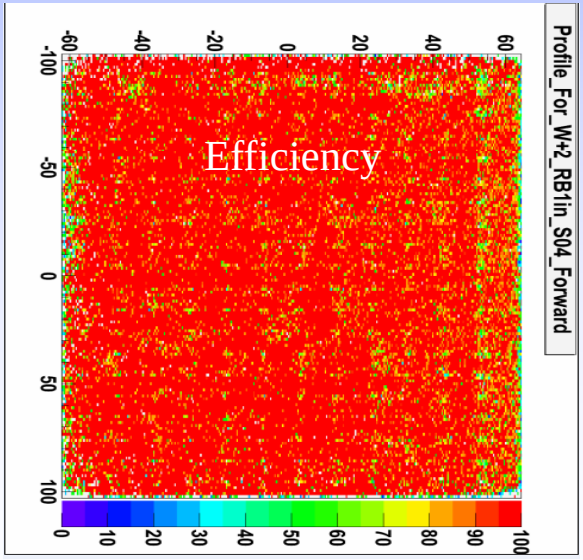
- *RPC: 6*
- *Drift Tubes, Straws, MWPC: 7*
- *Micropattern (GEM): 5*
- *Fundaments: 1*

RPC SYSTEMS

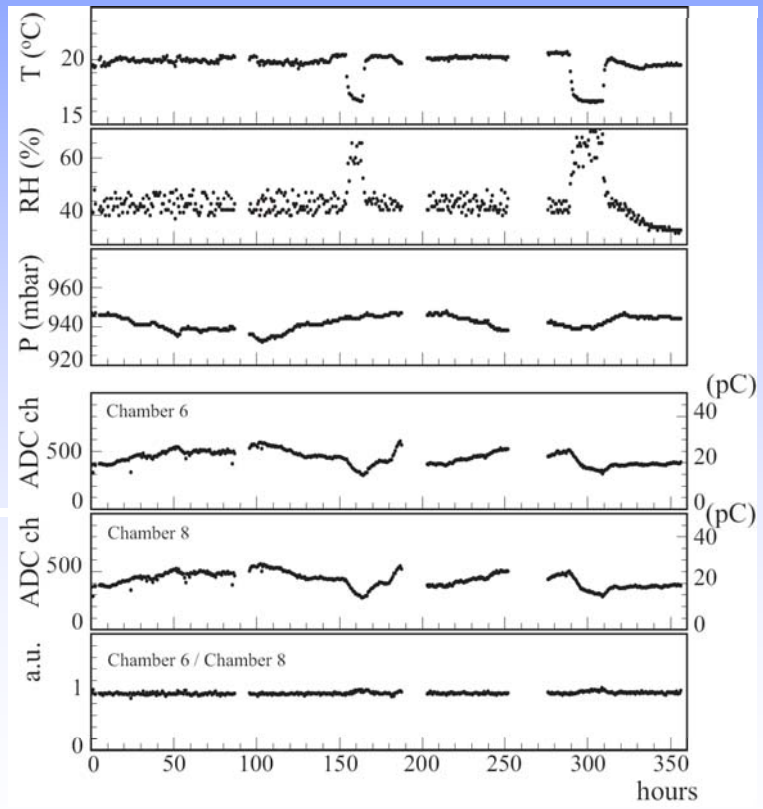
REMINDER: The very large number of modules used by the experiments require the development of automatic calibration, alignment and monitoring procedures.

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





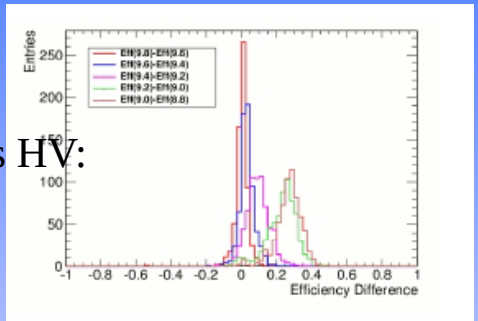
Stefano Colafranceschi: Operational Experience of the Gas Gain Monitoring System for the CMS RPC muon detectors



RPC SYSTEMS

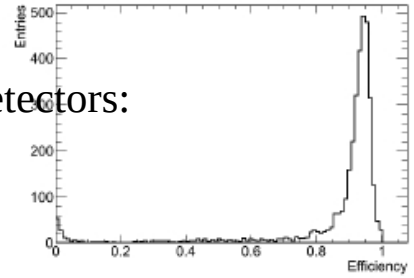
Giordano Cattani: Large-Scale Performance Studies of the Resistive Plate Chambers Fast Tracker for the ATLAS 1st-Level Muon Trigger

Efficiency spread vs HV:



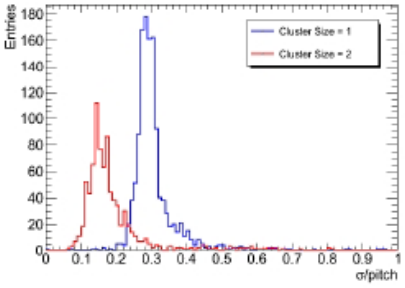
1.9%
DCS mapping errors

Mean efficiency, all detectors:



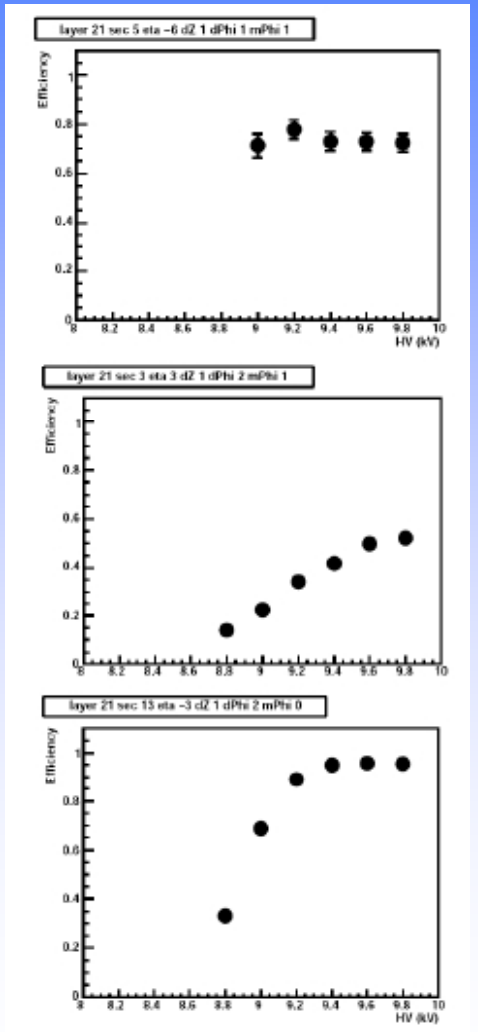
2.3%
Under investigation

Resolution:



Normal

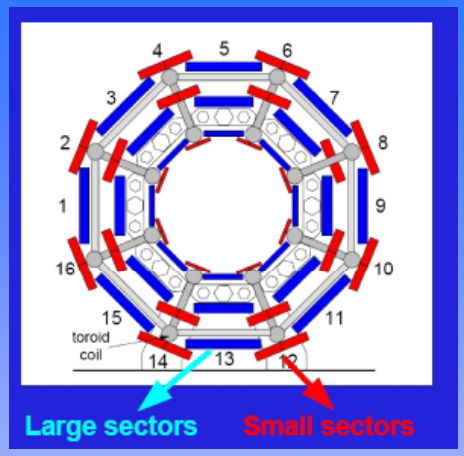
Efficiency vs HV:



WIRE SYSTEMS

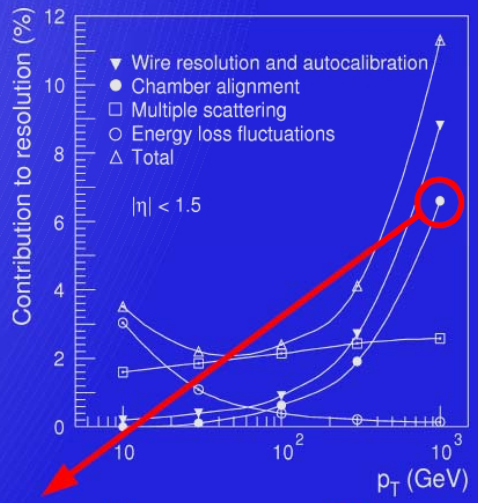
Igor Potrap: Alignment of the ATLAS Muon Spectrometer with Tracks

Monitored Drift Tubes (MDT)



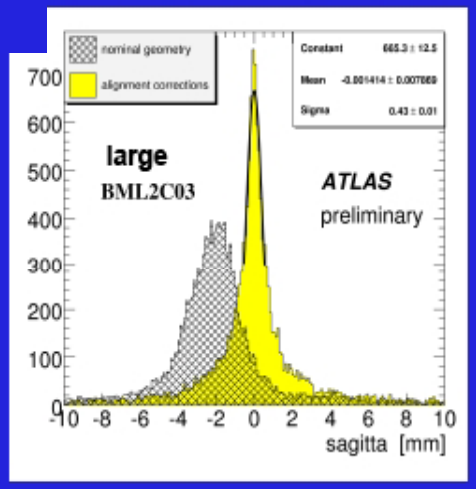
Resolution goal:
~10% at p=1 TeV/c

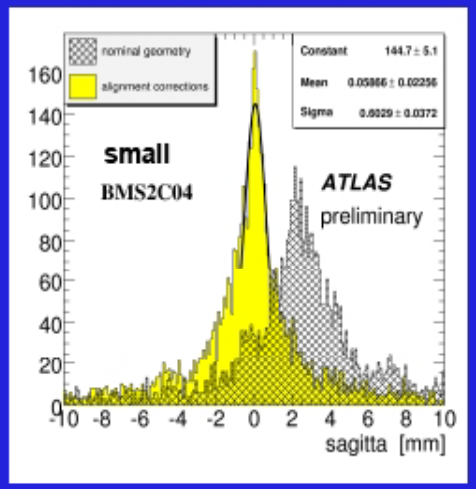
- muon track sagitta: ~500μm
- contribution from MDT tube resolution: ~40μm
- contribution from MDT chamber alignment: ~30μm



Muon chamber alignment accuracy: ~30 μm

Cosmic track sagitta with the **track-based** corrections

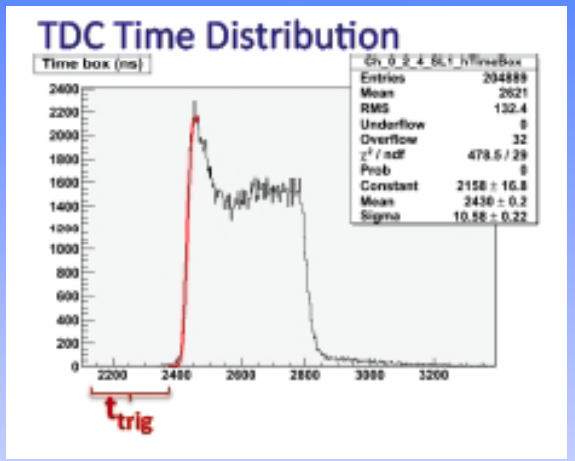


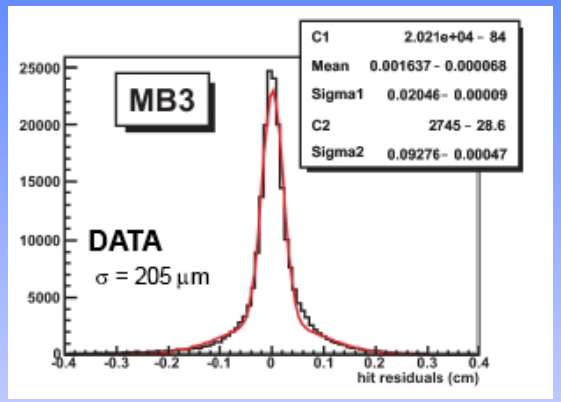


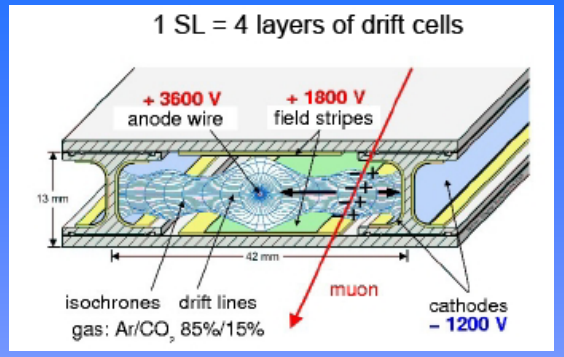
WIRE SYSTEMS

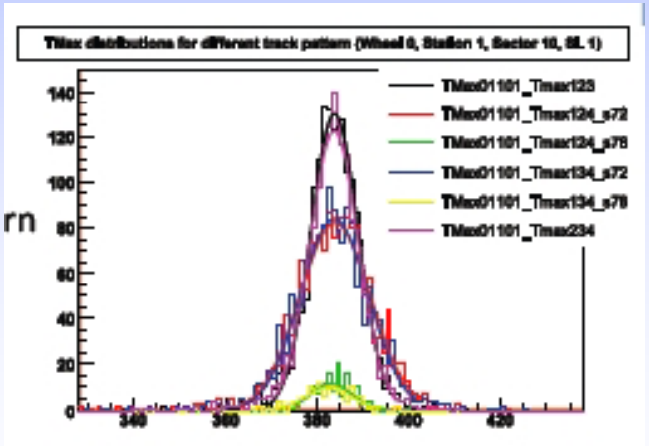
Giorgia Mila: Calibration of the Barrel Muon Drift Tube Chambers

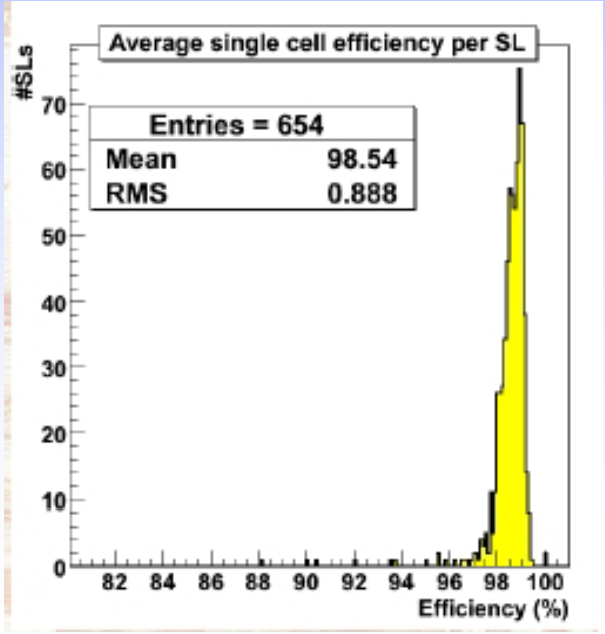
Gianluca Cerminara: Commissioning, Operation and Performance of the CMS Drift Tube Chambers







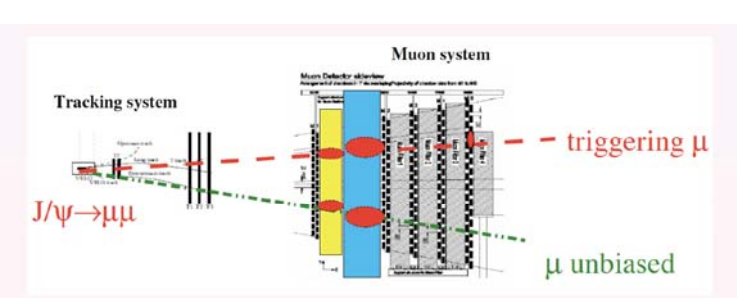


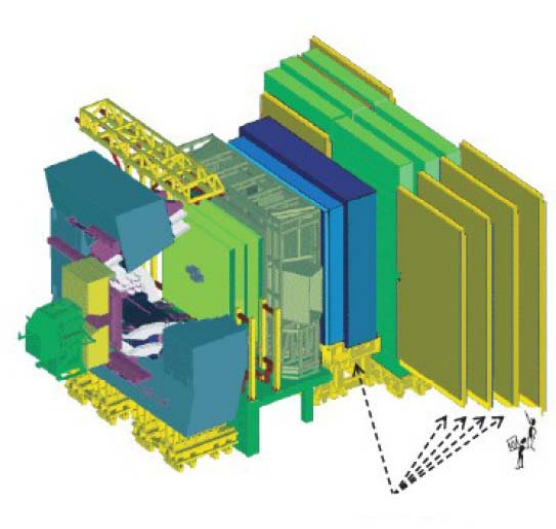


HYBRID SYSTEMS

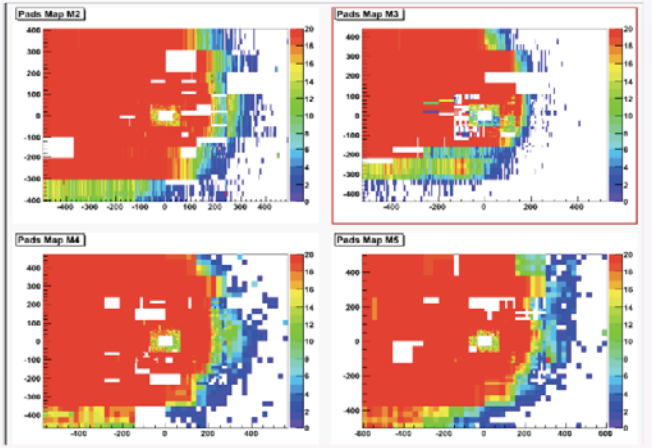
Sara Furcas: The LHCb Muon detector commissioning and first running scenario

1368 MWPC + 24 Triple-GEM





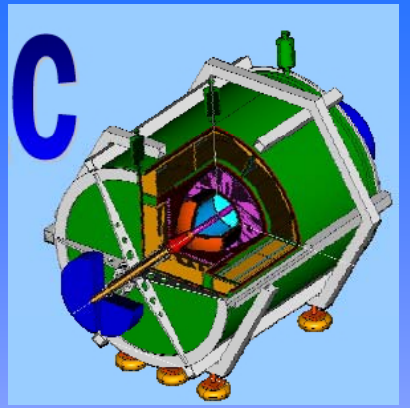
Data monitoring has been tested on beam 1 evts: holes (dead channels) have been fixed during shutdown (<0.5% channels remain to be fixed)



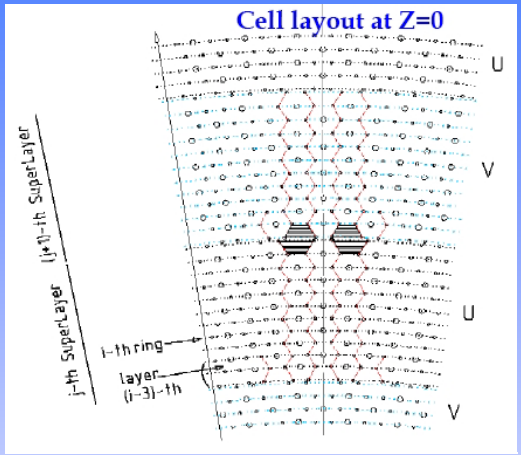
NEW CONCEPTS

Anna Mazzacane: The 4th Concept Detector for the ILC

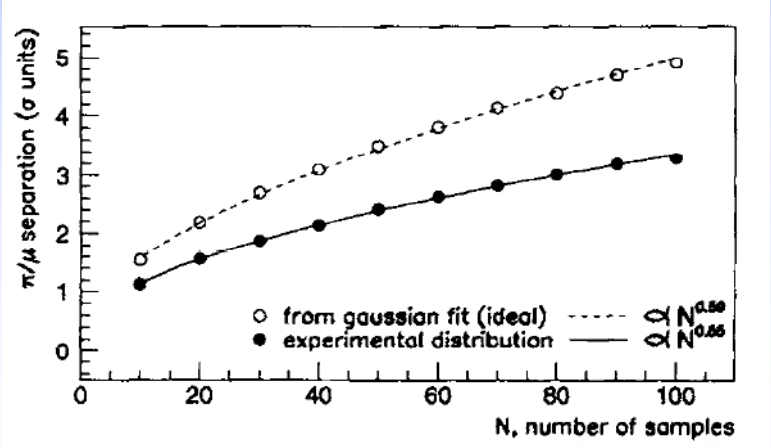
Giovanni Tassielli: Cluster Counting Drift Chamber as High Precision Tracker for ILC Experiments



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

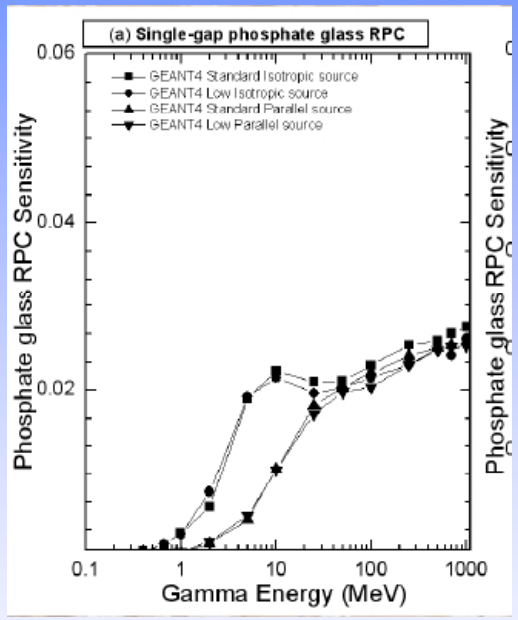


COMMENT: The cluster counting method for improving dE/dx resolution has been around since many years with mild success. The problems are:
- Light gases are needed to spatially separate the clusters, but their larger electron diffusion tends to scramble the clusters
- Single electron detection is needed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

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

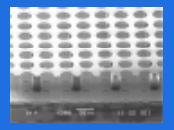


COMMENT: Conductivity in most glasses is due to ions migration, and modify the electrical characteristics with time (see the MSGCs experience!)

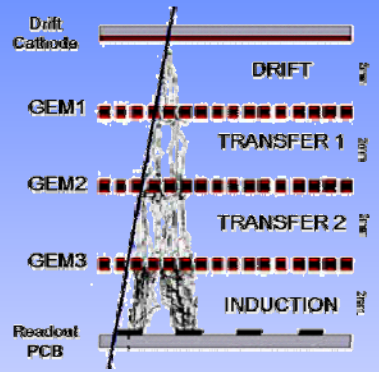
Saikat Biswas: Study of timing Properties of Single Gap High-Resistive Bakelite RPC
Small size silicone-coated RPCs, operated in the streamer mode.

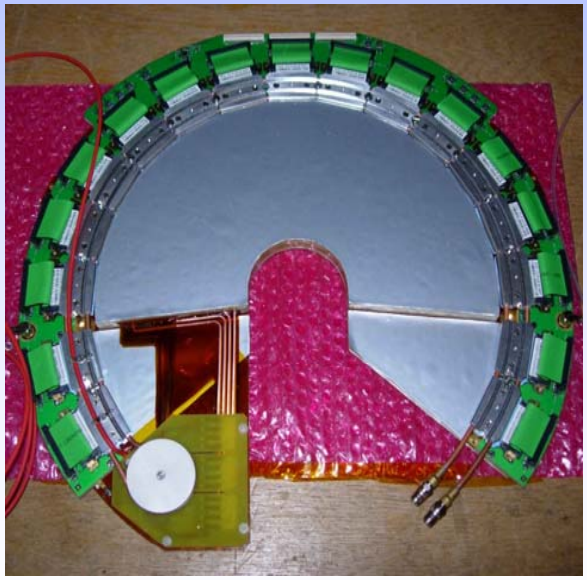
MICRO PATTERN GAS DETECTORS

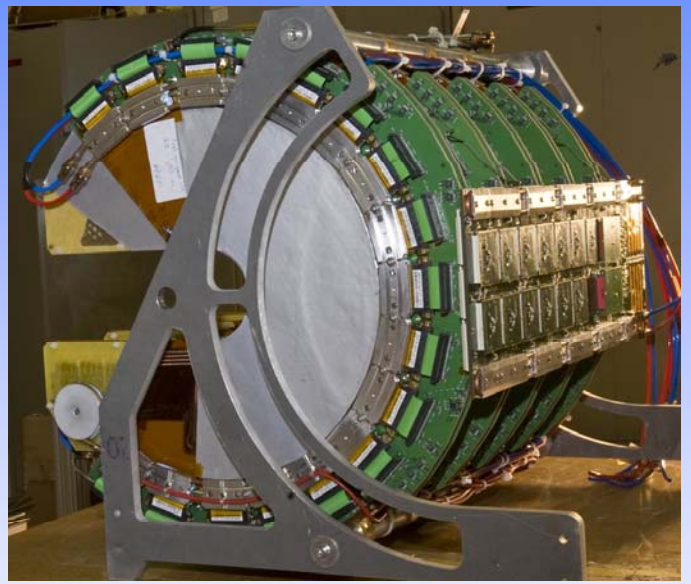
REMINDER: MPGDs have superior position accuracy, rate capability, radiation tolerance than wire-based detectors.



Maria Grazia Bagliesi: The TOTEM T2 Telescope Based on Triple-GEM Chambers



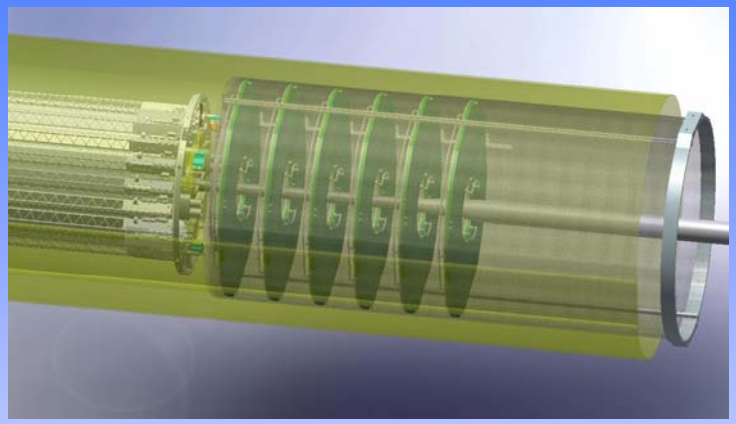


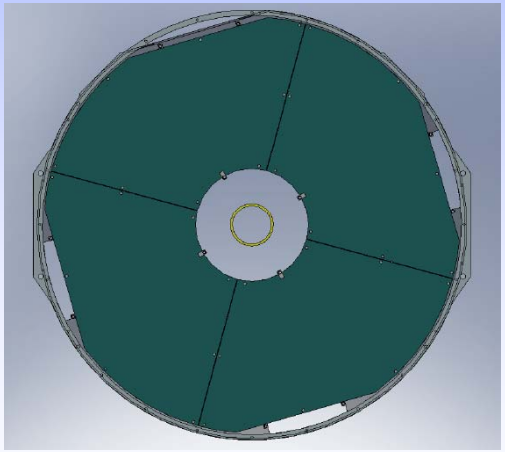


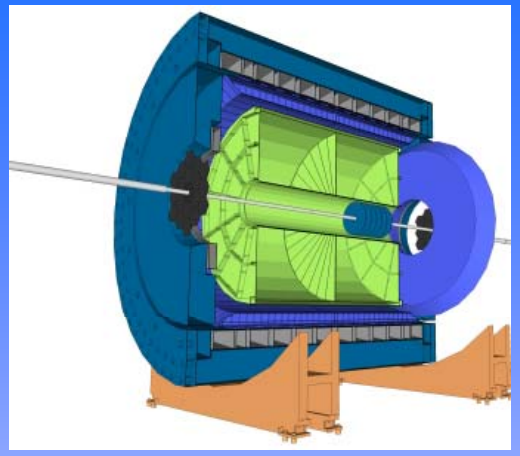
GEM

Bernd Surrow: The STAR Forward GEM Tracker

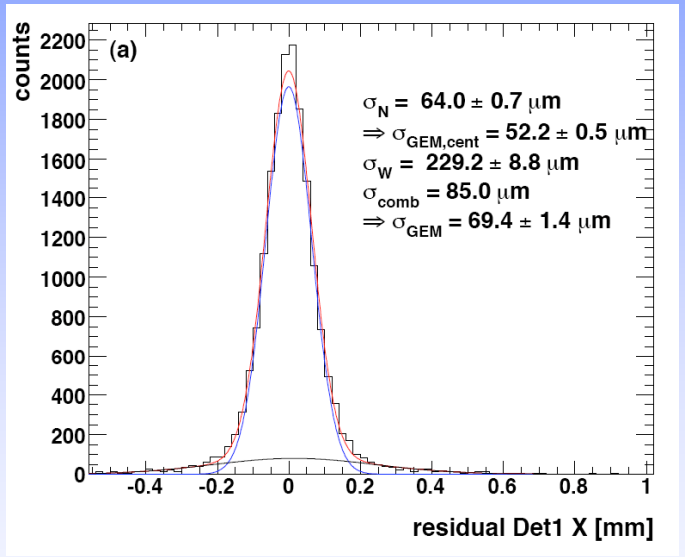
Triple-GEM detectors assembly.







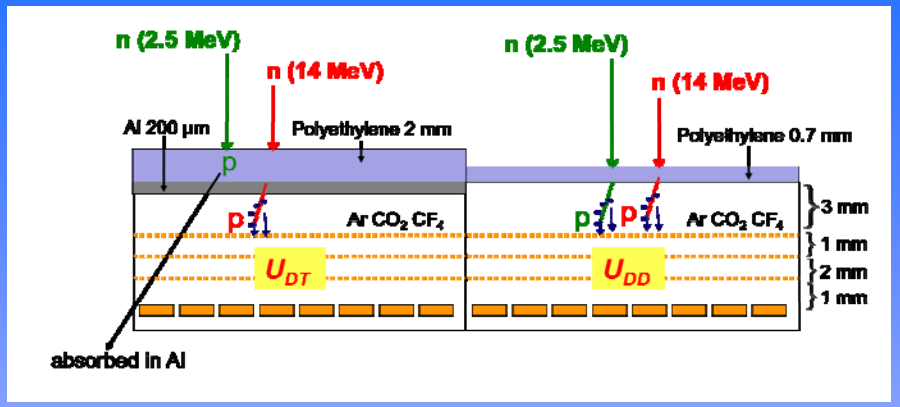
Prototype test beam results:

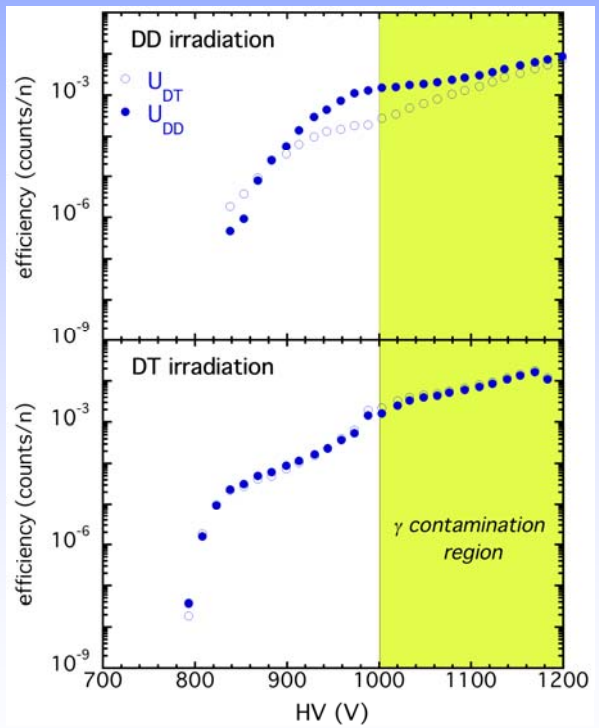


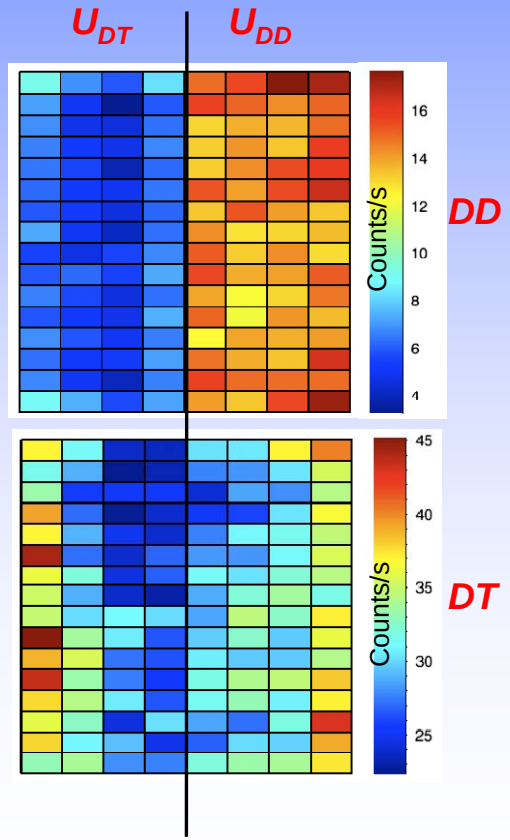
COMMENT: A major issue with the GEM technology is the quality control of the foils, industrially produced.

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

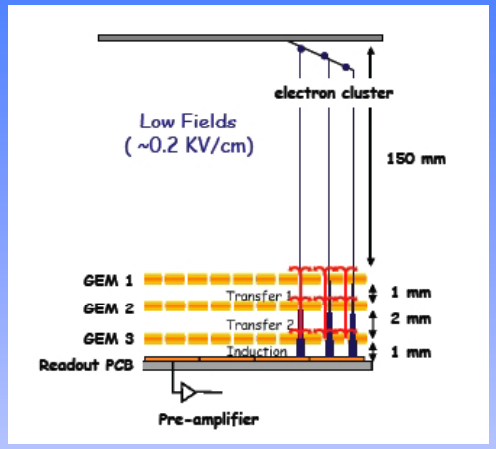
Triple-GEM detector with Polyethylene converters and pad readout; divided in two sections for 2.5 and 14 MeV n detection (DT), or 14 MeV only (DD).

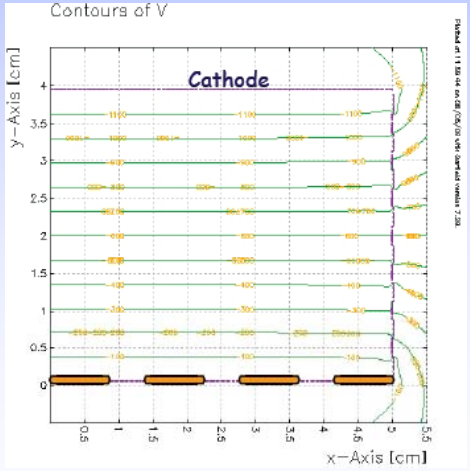


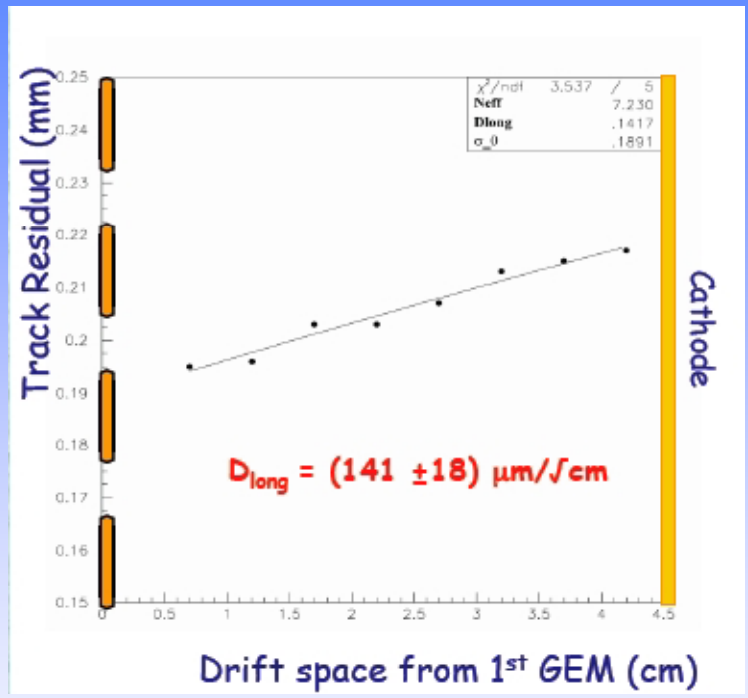




Marco Poli Lener: Performances of a GEM-Based TPC Prototype for New High-Rate Particle Experiments



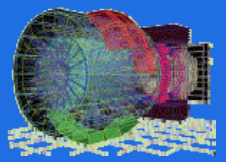




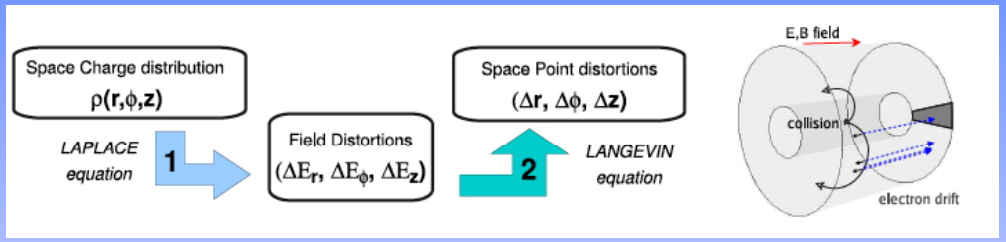
COMMENT: The main reason for using a GEM (or MICROMEGAS) End-Cap TPC Readout is the reduction of positive ion feedback, from ~ 20% (with MWPCs) to < 10^{-3}

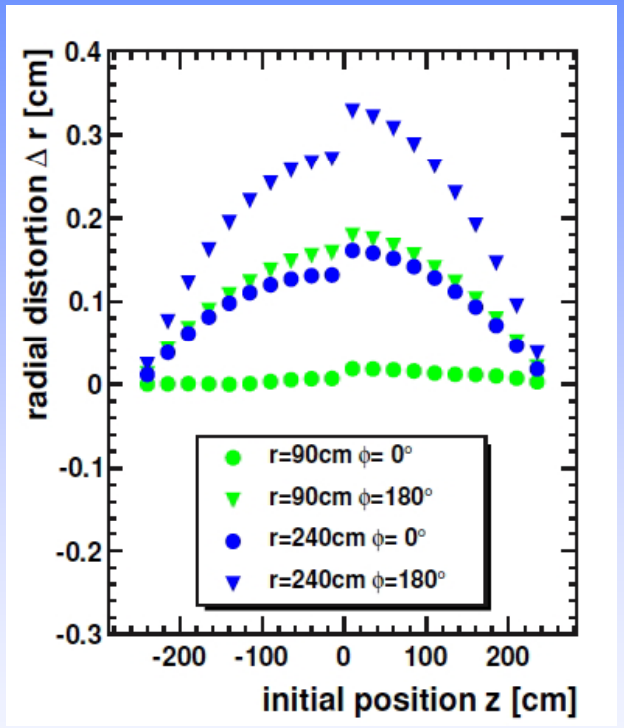
FUNDAMENTS : SPACE CHARGE

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!

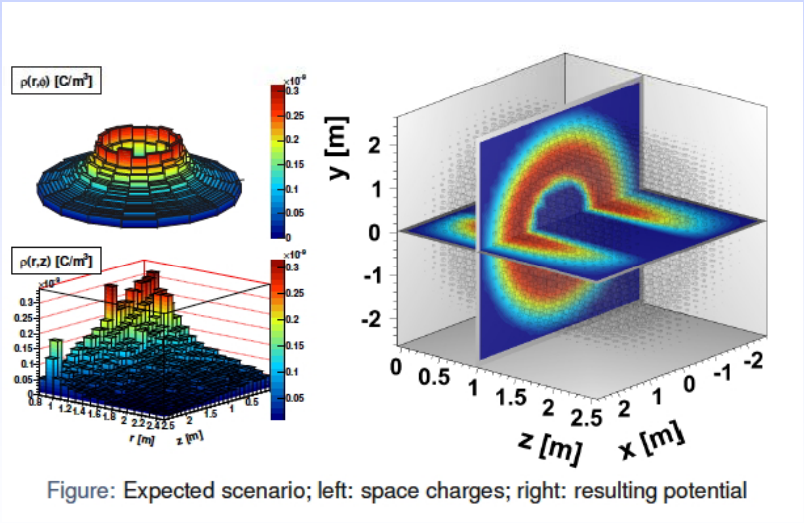


Figure: Expected scenario; left: space charges; right: resulting potential

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