RPCs test program at X5/GIF

- Motivation of the test
- Test program
- Cosmic rays test results of RPCs

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Motivation for the test

Following the recommendation of the LHCC:

" They noted that the final production chamber have not been radiation qualified. Therefore they want several big production chambers to be qualified at the GIF facility, to have results by Christmas. Some results could therefore be ready by the LHCC week 25-29 November"

Test program

- Units: 3 + 1 (spare) BML-D (3680 x 870 mm^2) fully tested in Naples with cosmic rays.

- Each Unit: 256 phi readout channels
  128 eta readout channels

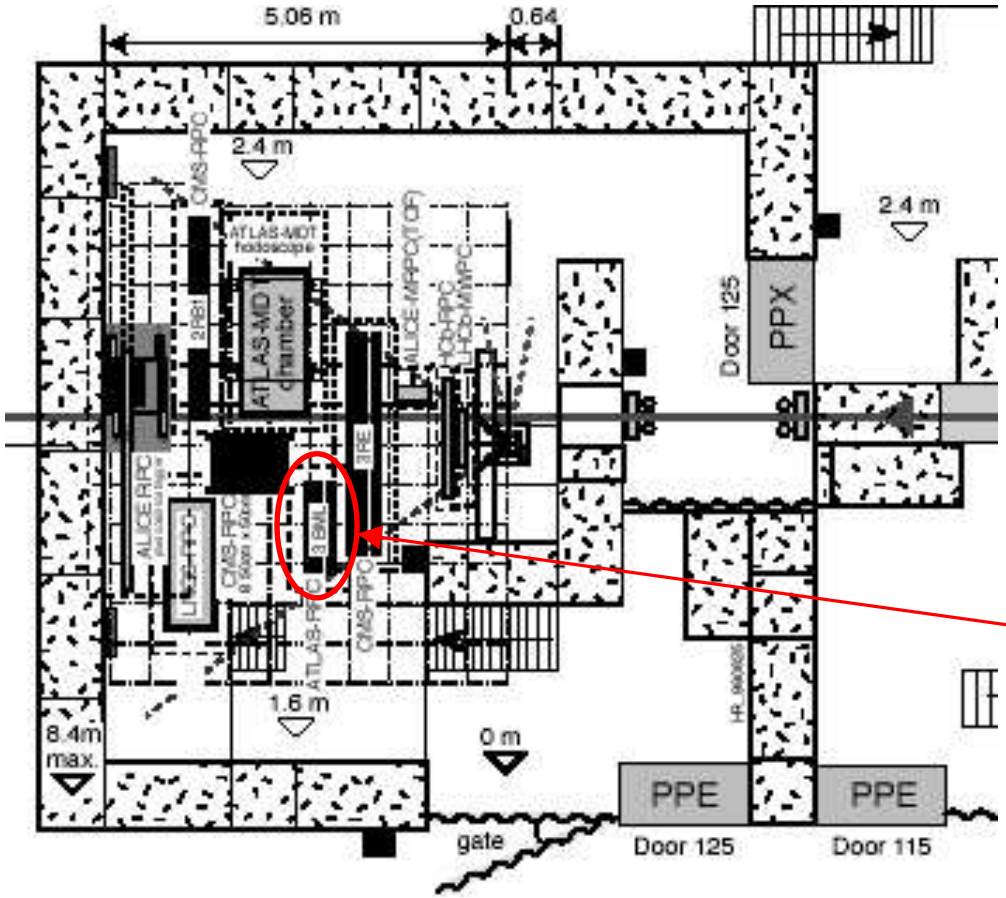
- Readout electronics:
  - 192 receivers + TDCs now
  - Allow the simultaneous readout of 212 (phi) x 636 (eta) mm^2 on 6 layers
  - Investigating the possibility of more (192 ?) channels in a couple of months

- DAQ, Monitoring & Control: Same used in the July test with small improvements

Test program

- Trigger: New (wider area) counters built in Roma2
- Mechanical support for chambers: now being built in Lecce
- Manpower: Joint effort from Lecce, Naples, Rome1, Rome2
- Start of test: As soon as the GIF area is available (Sept. 19th)
- Test program:
  - Continuous monitoring of currents and other parameters
  - Periodical measurements of efficiencies on different areas of the Unit with cosmic rays
  - Re-measure the Units in the test stand in Naples at the end of the test

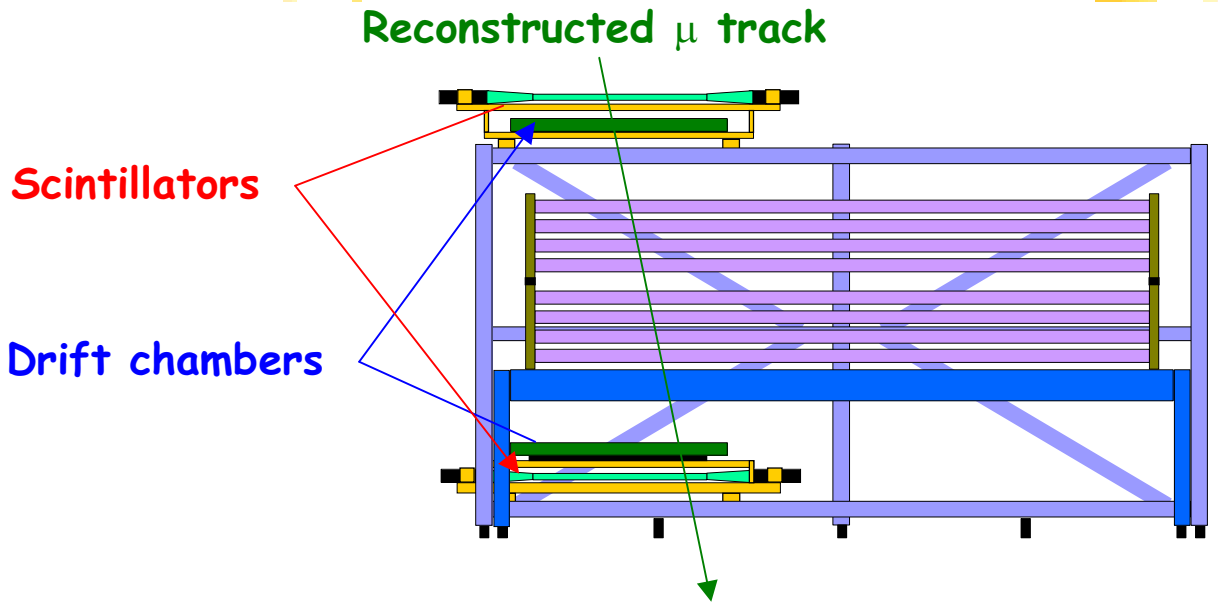
X%/GIF layout (not final)



- Latest (this morning) layout of the test beam area.
- Area is very crowded.
- We need more space.

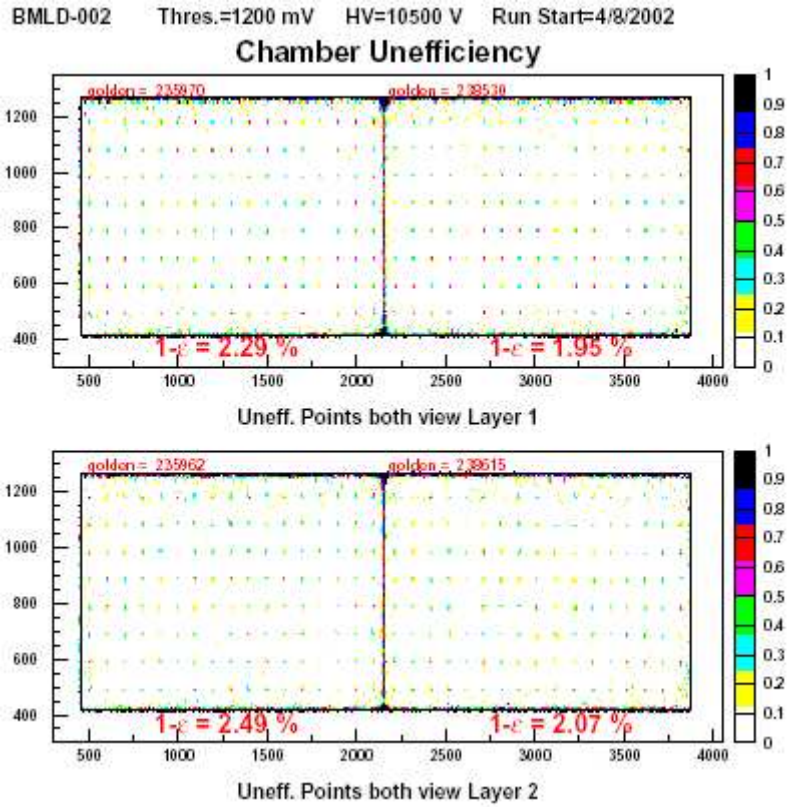
Cosmic ray test

RPCs for the GIF test have been tested in the Naples cosmic ray test stand



- "Radiography" of the full chambers: the double readout of each gas volume in a Unit allows to disentangle inefficient events due to spacers and frames from inefficiencies due to readout electronics
- Efficiency plateau refer to an area equal to the gas volume surface.
- Typical results of the test are shown in the following transparencies.

Cosmic ray Radiography

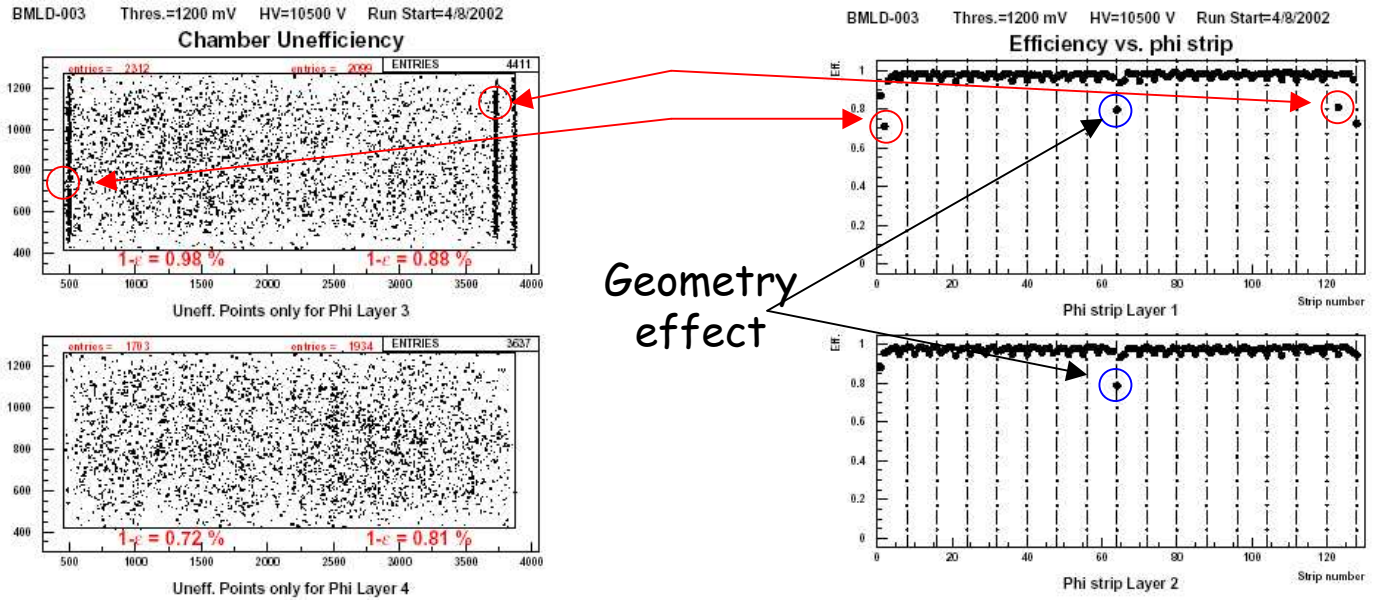


Inefficiency map of a Unit using reconstructed tracks for which neither phi nor eta were measured.

Spacers, frames, gas connections and the separation between gas volumes are clearly visible.

These inefficiencies are 2 - 2.5 %

Cosmic ray Radiography

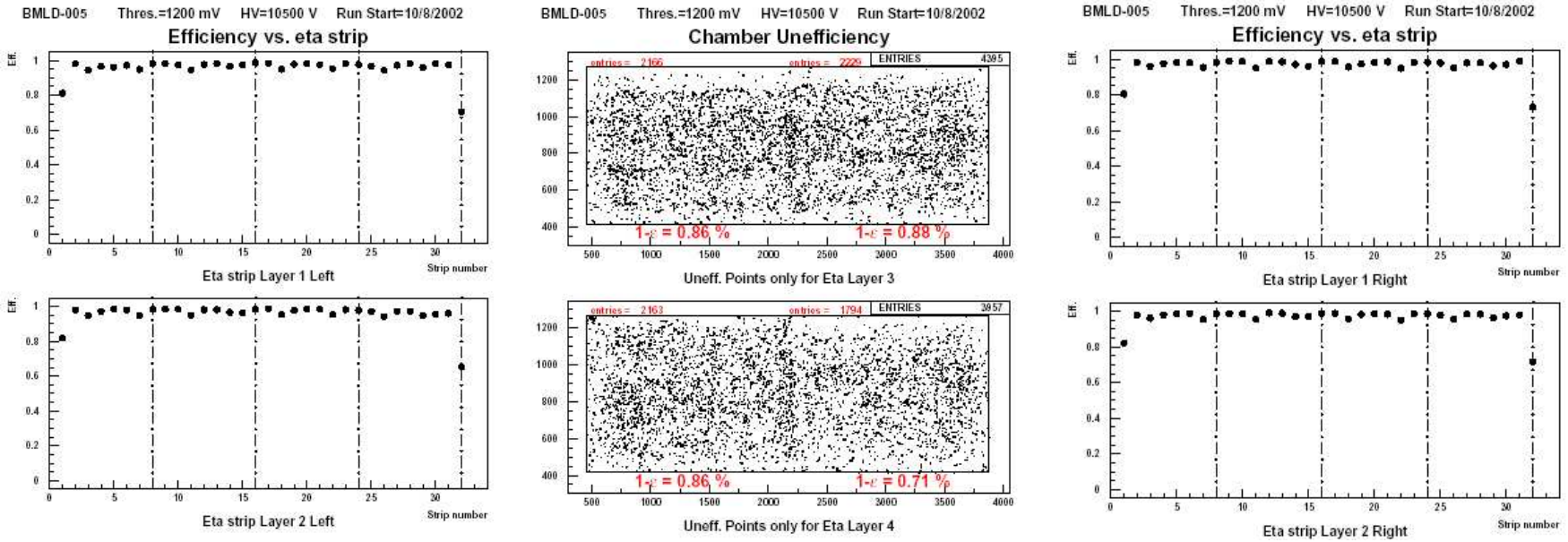


Reconstructed impact points of tracks for which eta was measured and phi was not measured.

Two readout channels with lower efficiencies are clearly seen.

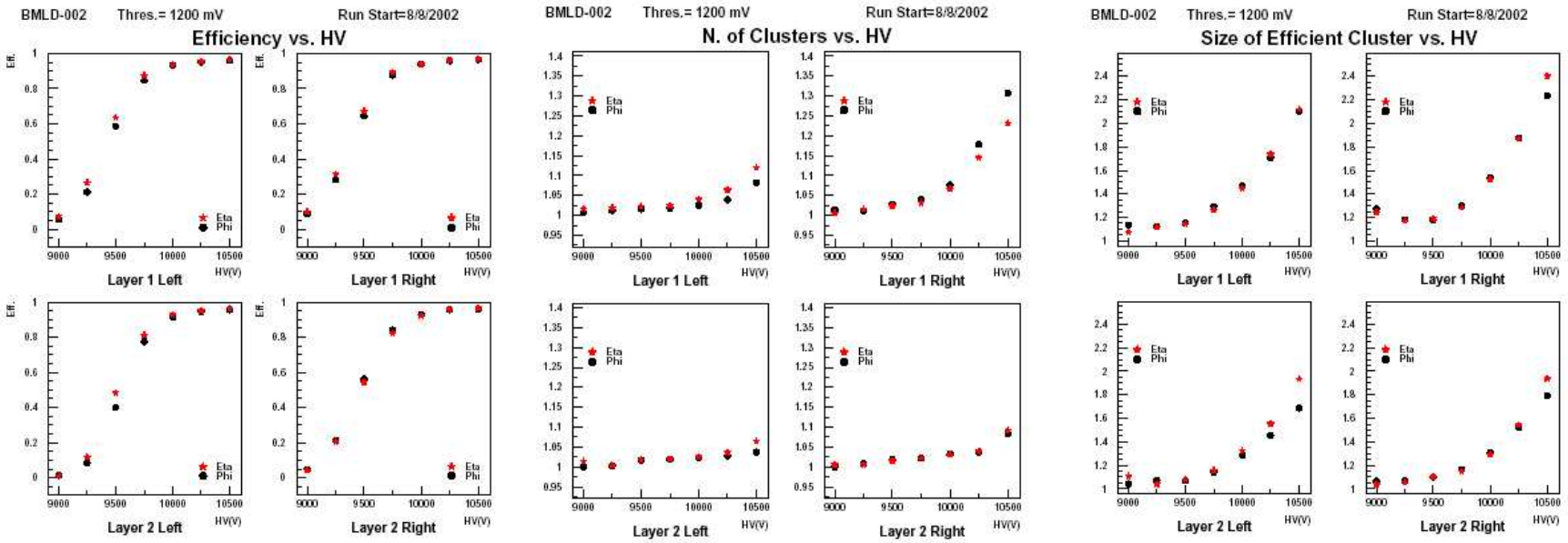
Total inefficiency for all gas volumes always below 1%.

Cosmic ray Radiography



Reconstructed impact points of tracks for which phi was measured and eta was not measured.
Readout channels # 1 and # 32 are affected by geometry effects,
Total inefficiency for all gas volumes always below 1%.

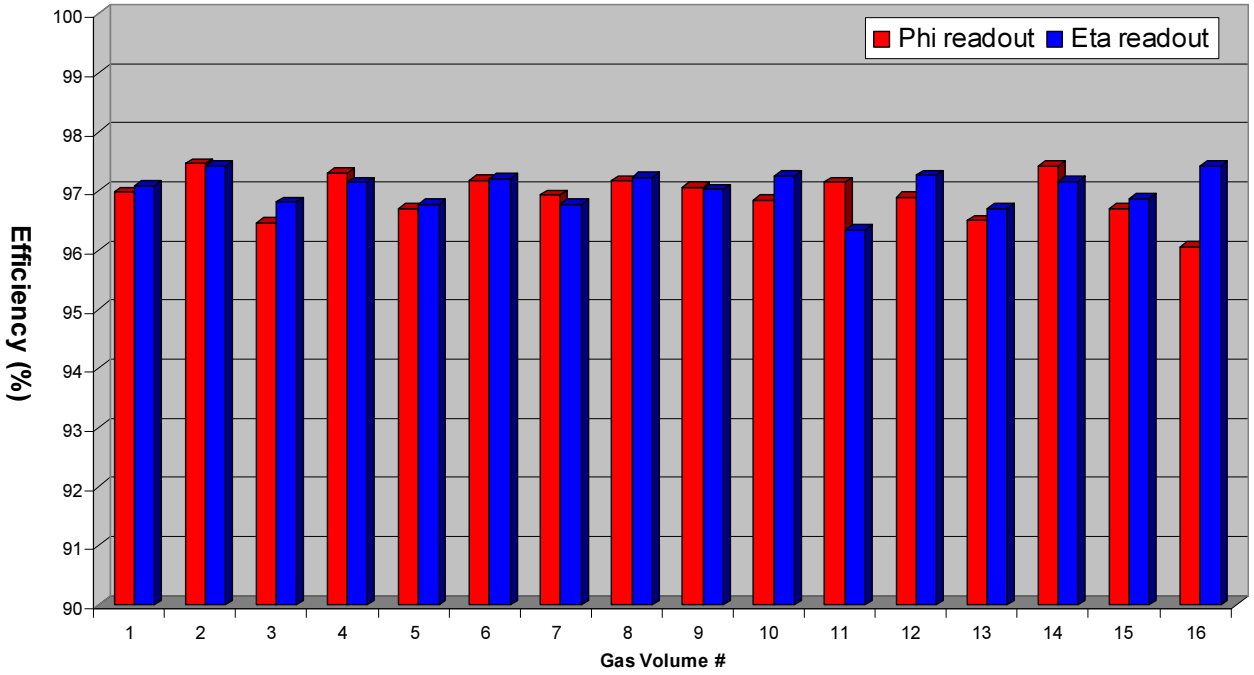
Efficiency plateau



Efficiency plateau, n° of cluster/event and cluster size as measured for eta and phi for 4 different gas volumes in one Unit.

Summary of tested chambers

Summary of all 16 Gas Volumes Efficiencies



All gas volumes have ε > 96% on both views @ 10.5 kV and 1.2 V threshold