DHCAL SmallRPC's TestBeam Analysis

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Outline
General Introduction
Data Quality Checks
Conclusion

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- General Introduction
- Data Quality Checks
  - Uniformity
  - Stability
  - Systematic effects
- Conclusion + to do

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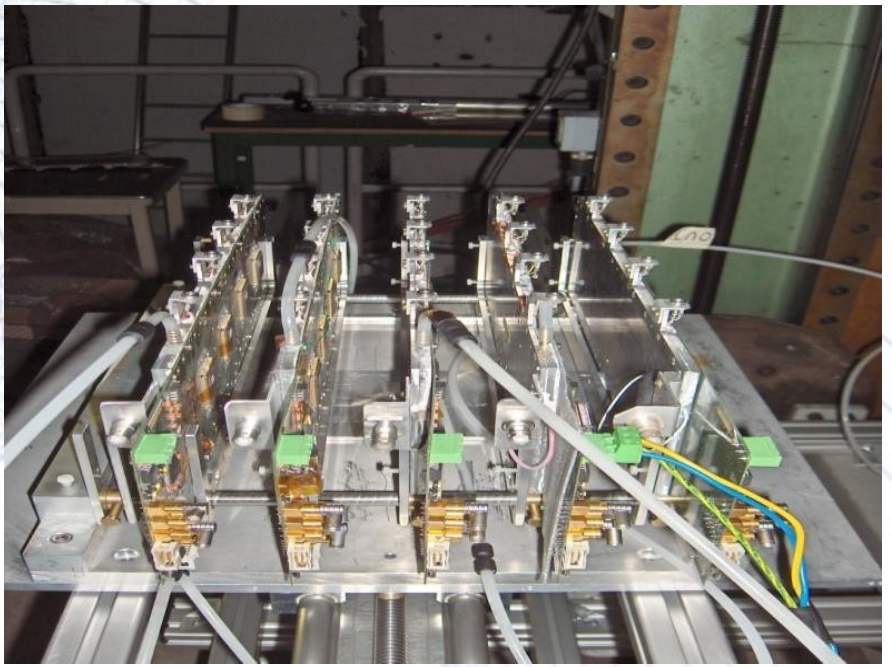
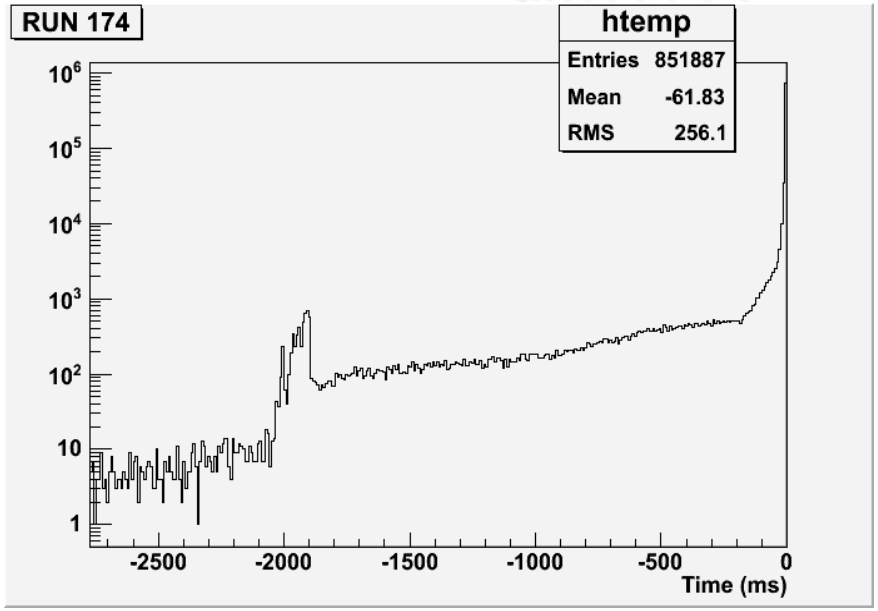
- Why DHCAL: high granularity, robust and cheap
- Key point = Efficiency and multiplicity study



- MiniDHCAL prototype
  - miniDHCAL: 4/5/6 RPC
  - RPC: 4 Asics
  - Asic: 64 Channels
  - 2 Scintillators: Trigger

  --> Read recorded events



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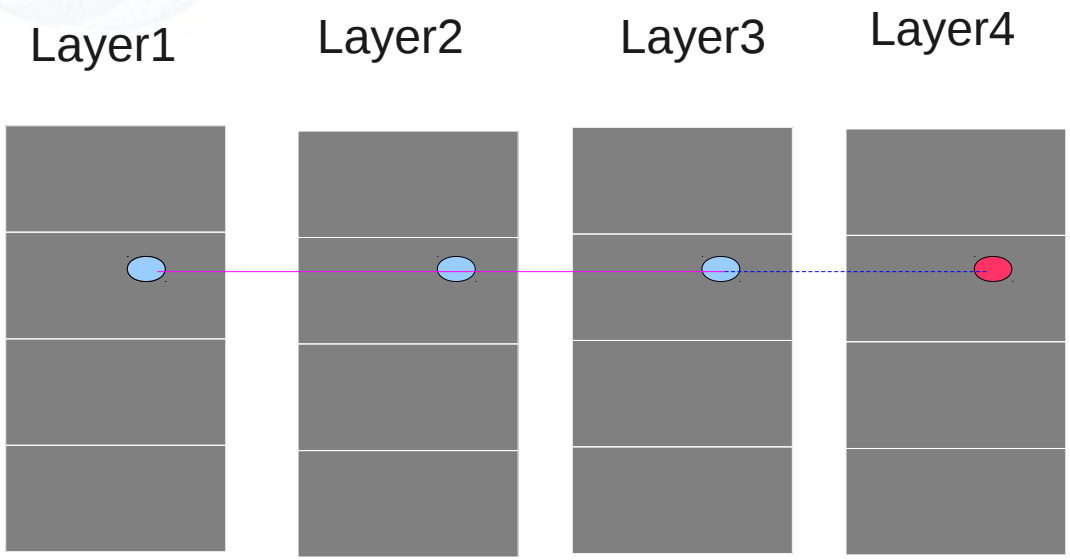
- Efficiency = Probability to find a track reconstructed on 3 layers in the 4th layer
- Method = Look for aligned hits in 3 layers (« telescope ») to study the 4th
- Multiplicity = number of hits in each layer



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Beam Tests

- July/August 2008: 4 Russian RPC's ; PS beam @ CERN → Data quality checks (all 30 good runs)
- November 2008: 4 Russian RPC's 1 Multigap RPC ; PS beam @ CERN
- June/July 2009: 4 Russian RPC's 1 Chinese RPC 1 m² RPC ; PS beam @ CERN
- August 2009: 4 Russian RPC's 2 Chinese RPC 1 m² RPC ; SPS beam @ CERN
- Totally ~ 1000 good runs,

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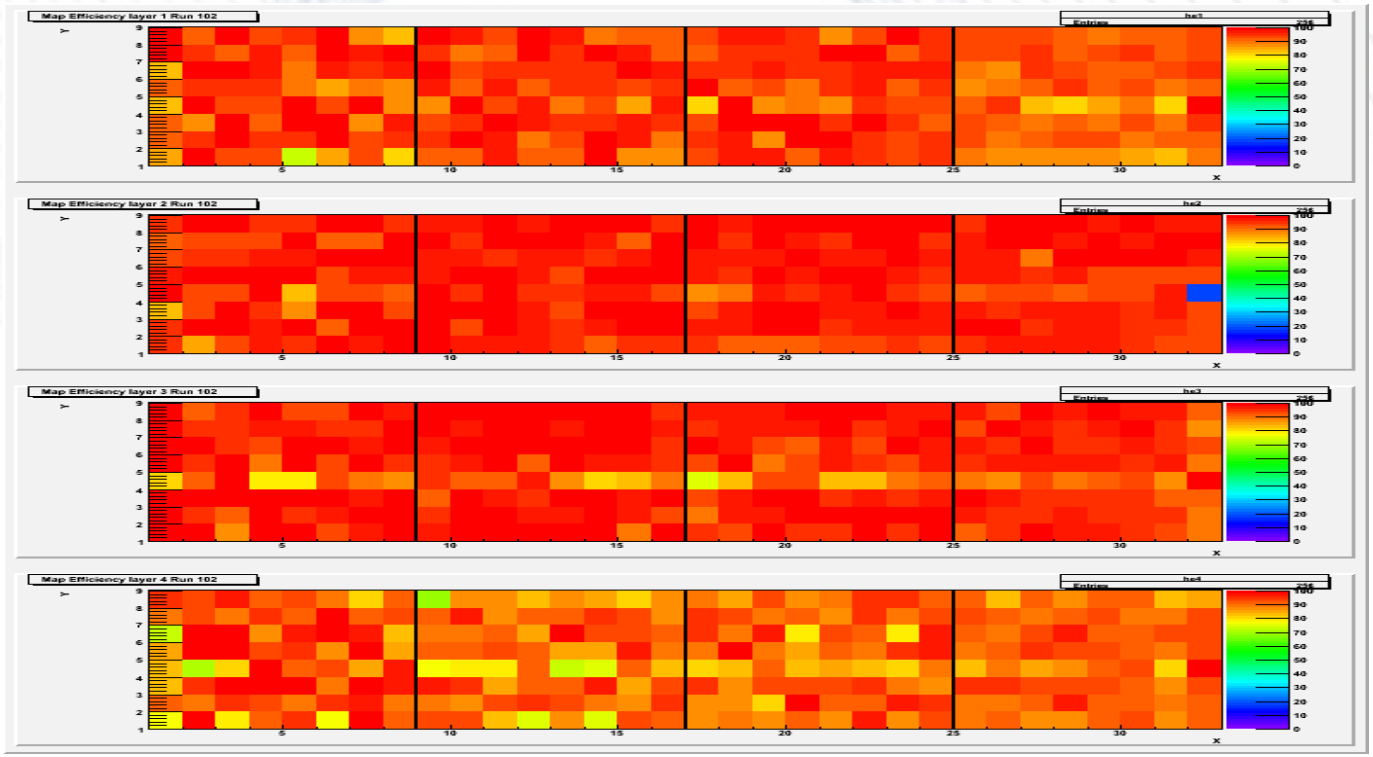
- Detector Uniformity:
  - With HV=7.4 kV RUN 102



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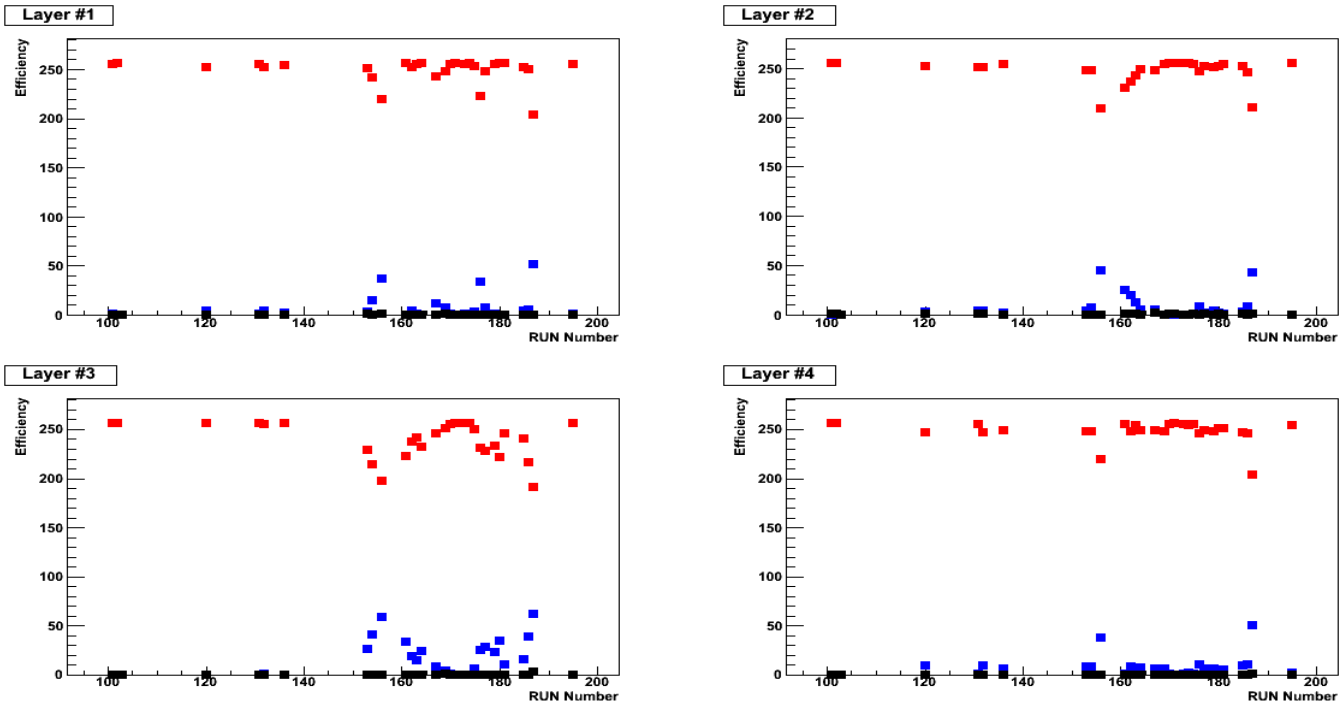
- Stability of Efficiency in time
  - 3 categories of cells:
    - Efficient cells: Eff > 65%
    - Medium cells: 20% < Eff < 65%
    - Dead cells: Eff < 20%



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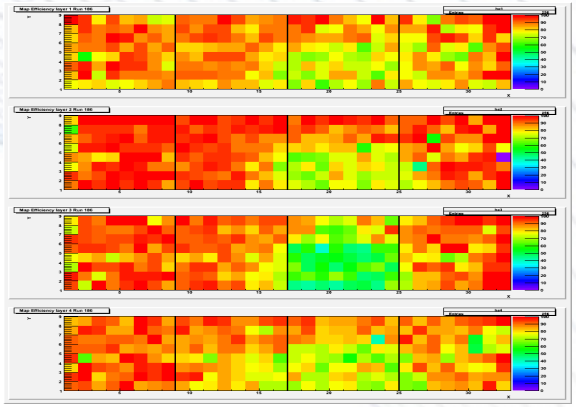
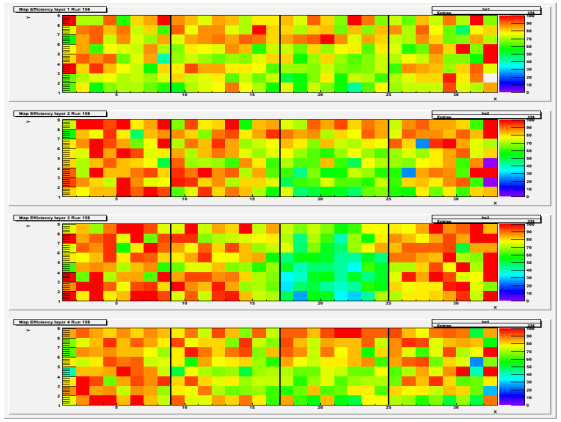
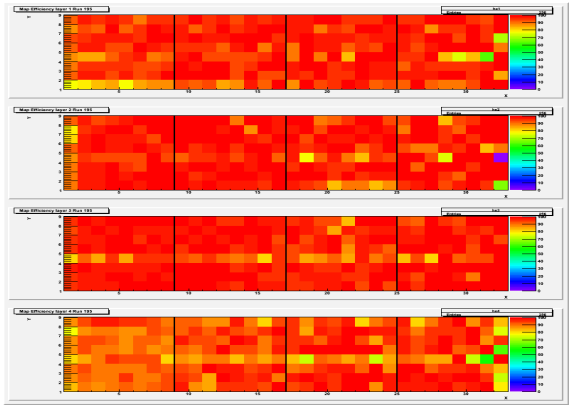
- Efficciency vs HV



RUN 156 HV=6.8 kV



RUN 186 HV=7 kV



RUN 195 HV=7.4 kV

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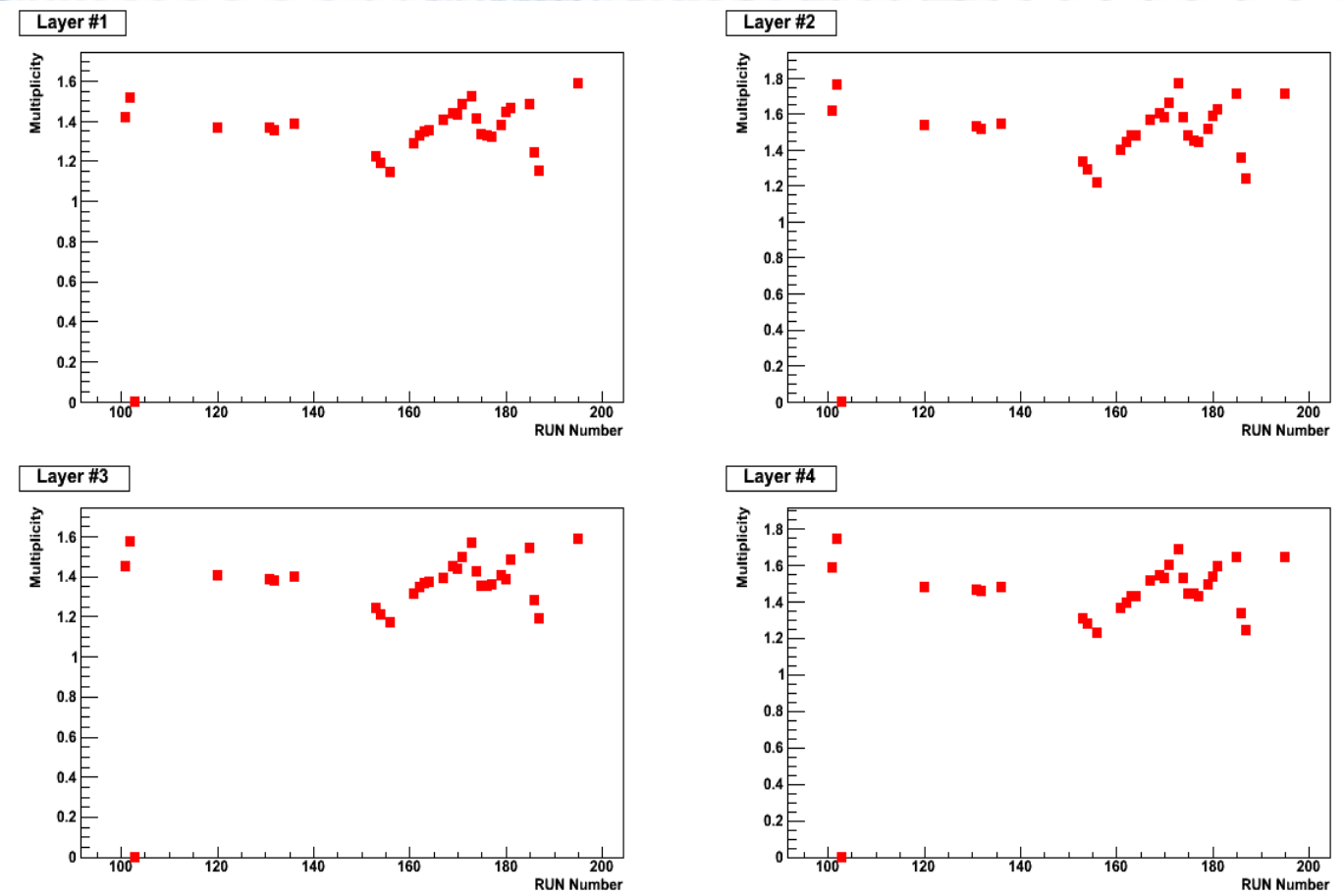
- Stability of Multiplicity in time



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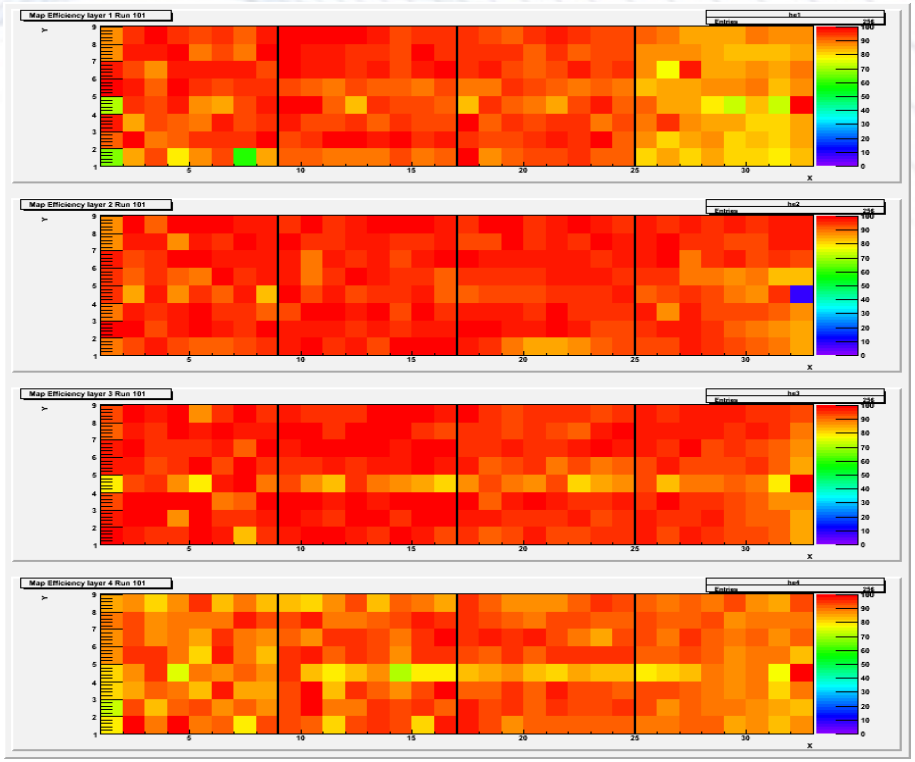
- Systematical effects:
  - Fish line between the two plates

Efficiency map
RUN 101



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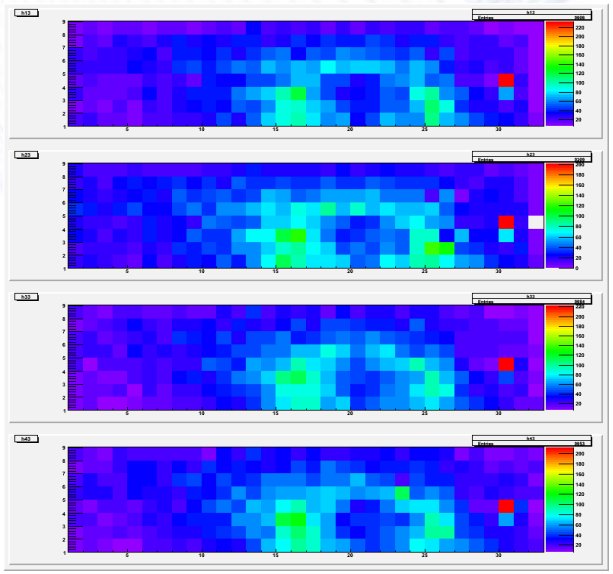
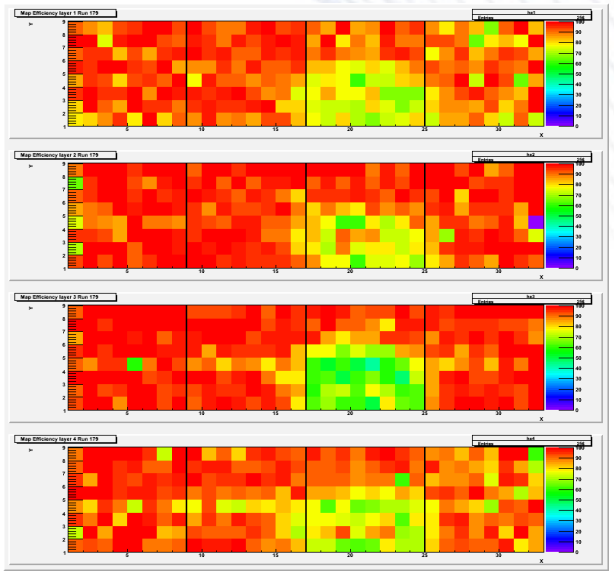
- Systematical effects:
  - High rate areas

Beam profile RUN 179
(after tracks reconstruction)



Efficiency map RUN 179



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- Data analysis confirm the stability and uniformity of the detector.
- High Efficiency with optimal parameters
- To do :
  - process all runs analysis with Chinese RPC's to confirm expected high efficiency with high rate
  - 1m² prototype analysis