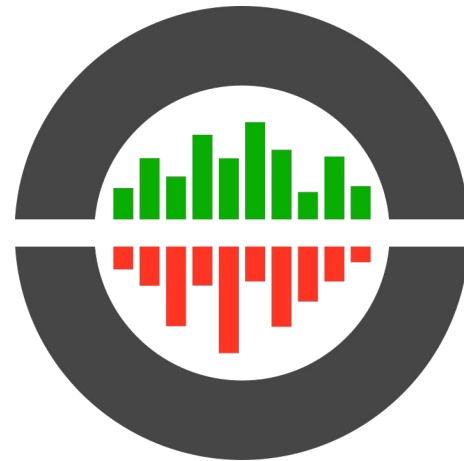


# Data analysis and correlations from the testbeam using DQM4hep

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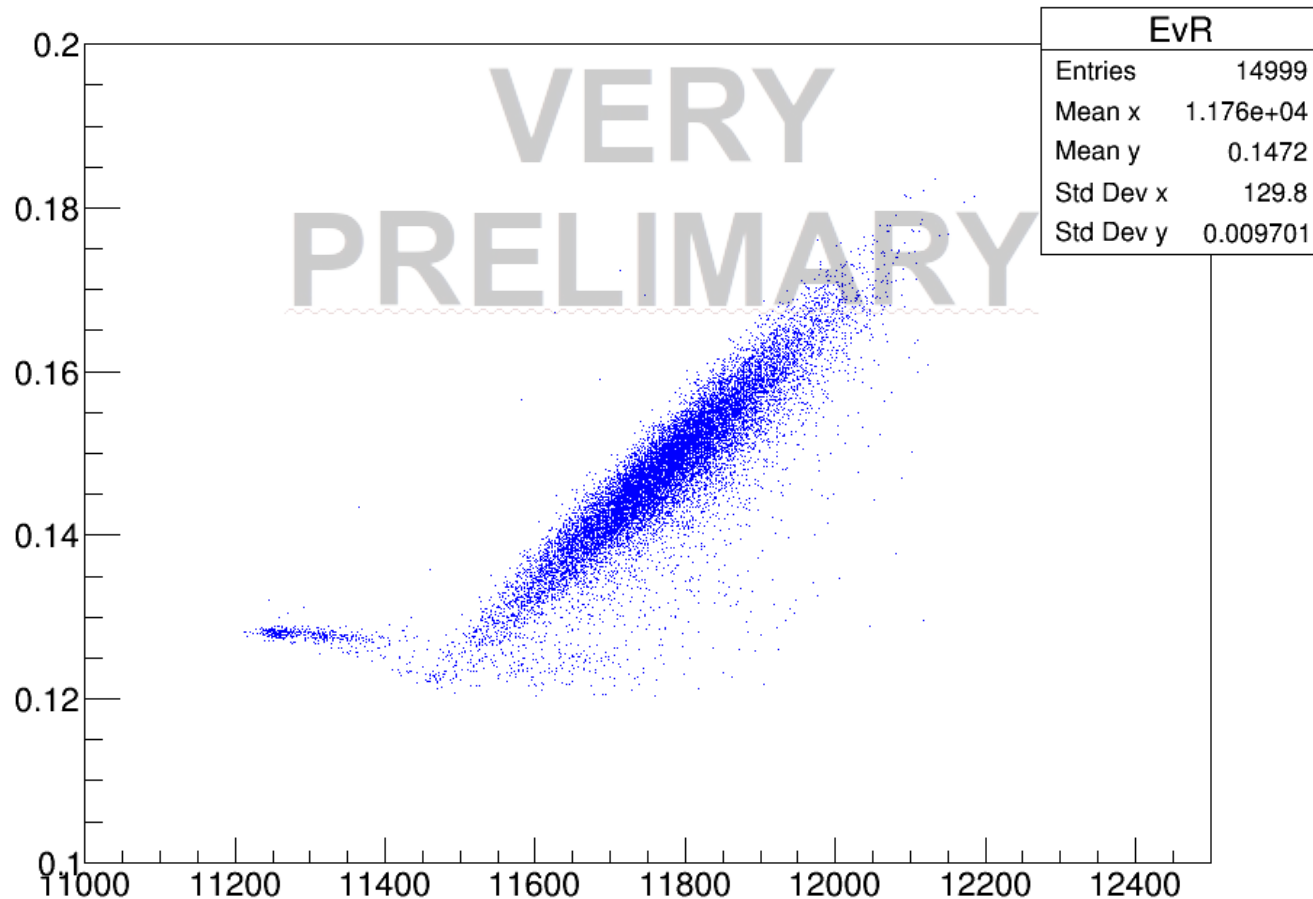
2018-10-10

# DQM4hep as a quality and analysis tool

- DQM4hep not just for online monitoring – all processes can be done offline with stored data, and a suite of data quality tools are available (and we can make our own if the stock ones aren't enough)
- Quality tests (*qtests*) can be used for statistical measures, fitting functions, comparison with references, etc. for any kind of data
- Offline analysis is easy and simple, using basic C++11 code that can also use ROOT objects or functions
- A nice bonus – any analysis developed offline can be used online at later (?) testbeams

# Sample of some analysis

Energy per event vs. Energy ratio per event



- Towards end of the testbeam, begun to do some basic analysis in DQM4hep modules
- Run 12709 – 20 GeV electrons with 5mm PS
- Some caveats:
  - Using raw ADC, not true energy
  - Only RD52, no GEM or muon trigger
- But:
  - Clear separation of two sets!
  - Looks as we expected!
  - Fast! 15,000 events process in 8-10 secs

# Data considerations

- Need some way to easily access data from various runs and detectors – addressed in Nicola's talk
- Data from *electron* runs can be used to establish a sensible cut for the E vs. R plot, to separate out electrons
- Data from *muon* runs will help to show what the selection criteria in the muon trigger should be, to separate out muons
- With all these combined, we should be able to distinguish electrons, muons, and hadrons from each other reliably

# Correlations

- Currently no way to merge data from multiple sources in DQM4hep – *one* file reader for *one* analysis module for *one* archive
- Merging data will have to be done with a separate tool
- This tool exists! See Giuseppe's presentation
- Important points for right now:
  - Already works for RD52 and GEM data
  - Could be expanded for drift chamber

# Summary

- DQM4hep puts us in a good position for doing analysis – should be fast to run and easy to edit
- Any work done counts twice – now for offline analysis, and later for online monitoring we do at future testbeams
- Some open questions or matters to resolve:
  - Easy sourcing of data – Nicola's talk
  - Tool for merging ntuples – Giuseppe's talk
  - Beam composition/profile at SPS?