

KLM - first data

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Outline

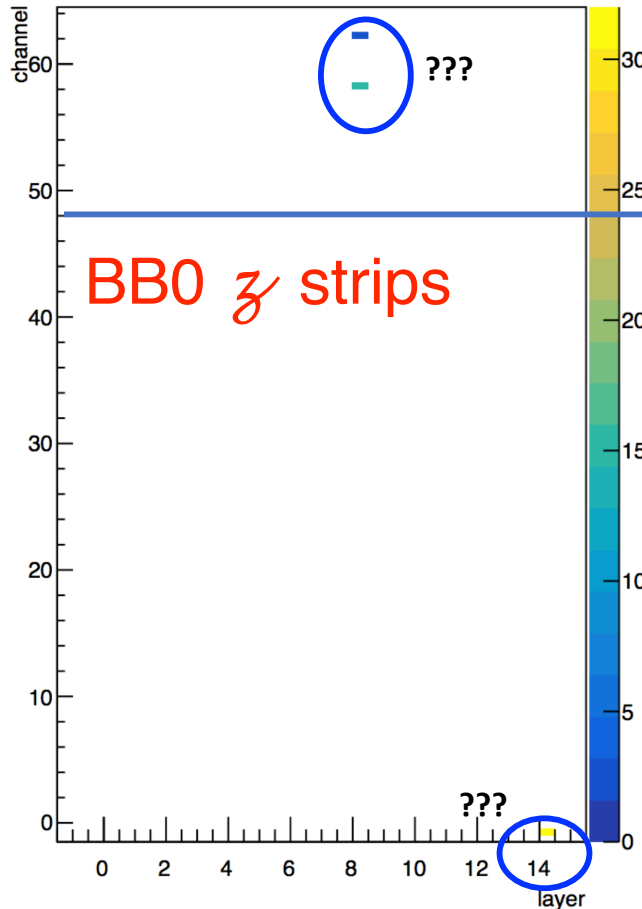
- Hardware status
- Standalone BKLM efficiency
 - very preliminary!
- CDC track match BKLM efficiency
 - very very preliminary!

Several plots borrowed from Z. Stottler

Occupancy - BBO

RUN 1517

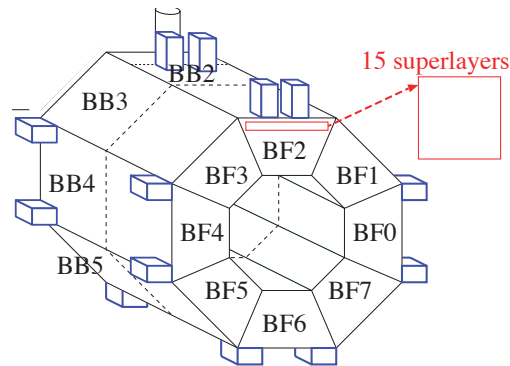
The bad



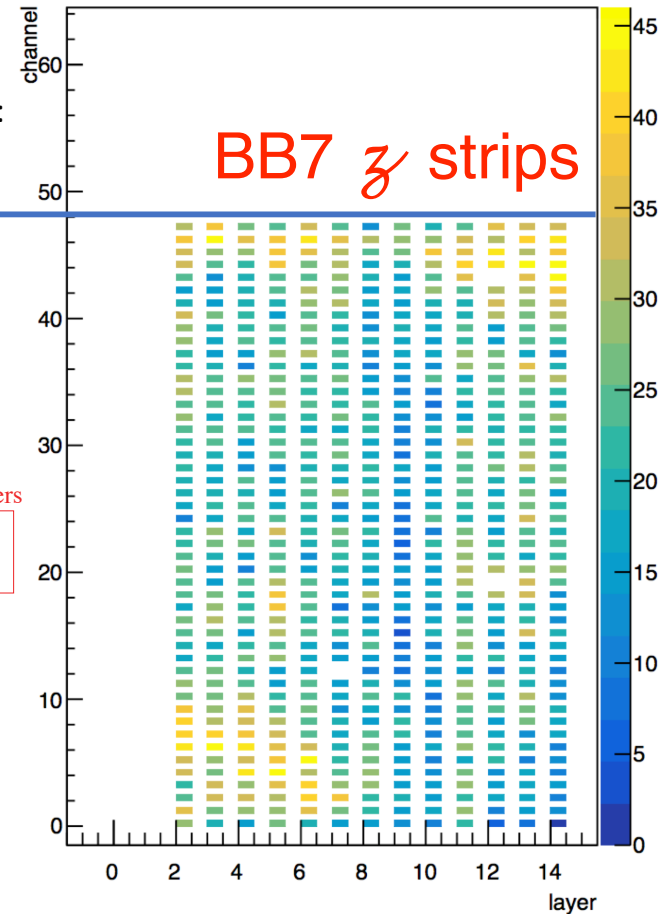
Compare with a good Hitmap.

Notice 2 things in the BBO Hitmap:

1. There are hits with a channel number of -1
2. There are hits in channel numbers that do not correspond to hits in the RPC layer.

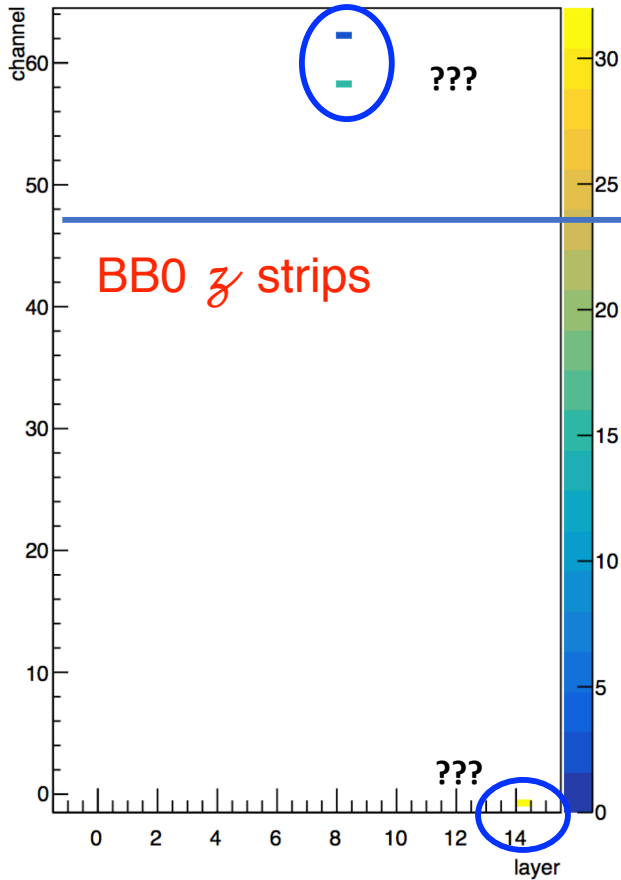


The good



Occupancy - BF4

Run 01514: BB0 z Strips



BB0 z strips

Compare with the BF4 Hitmap.

BB0 has a known power supply issue.

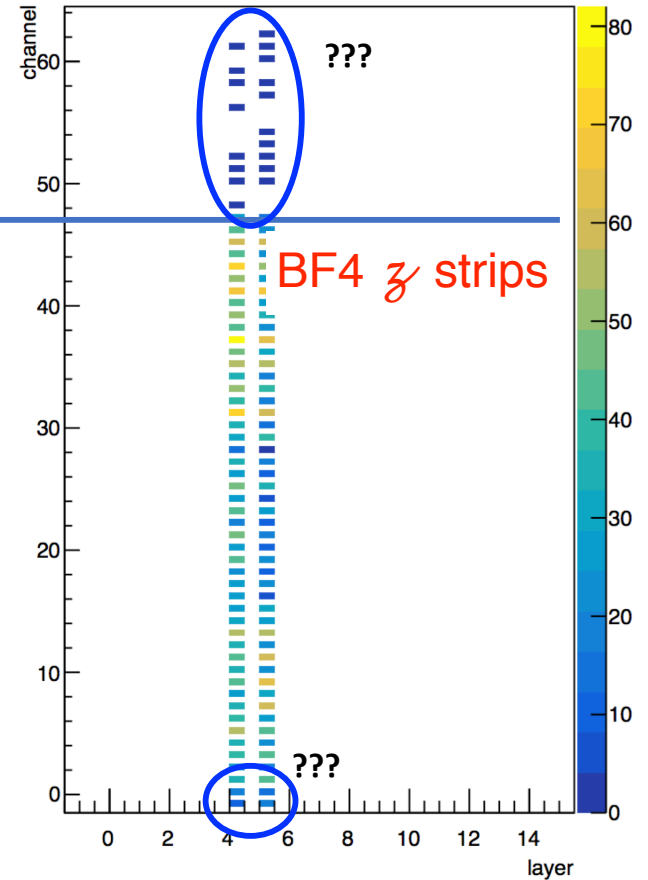
Notice both markers of a power supply issue are seen in BF4.

Unfortunately, BF4 sits in a very tight area and there is another crate that sits directly on top of the rpc crate (~2 inches of clearance).

The power supply could not be tested, but there is clear indication that it is a power supply issue.

→ BF4 has been dogged by power issues since the GCR2.

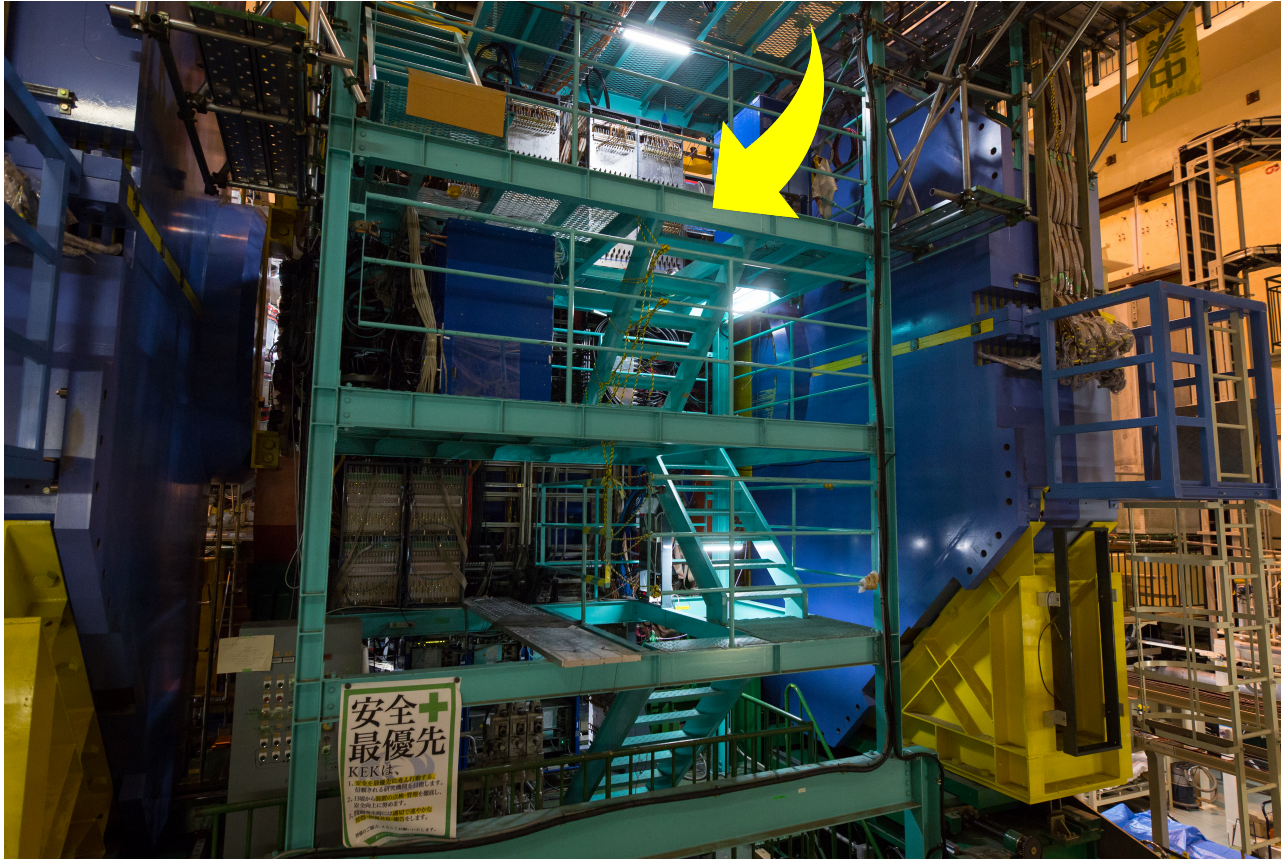
Run 01514: BF4 z Strips



BF4 z strips

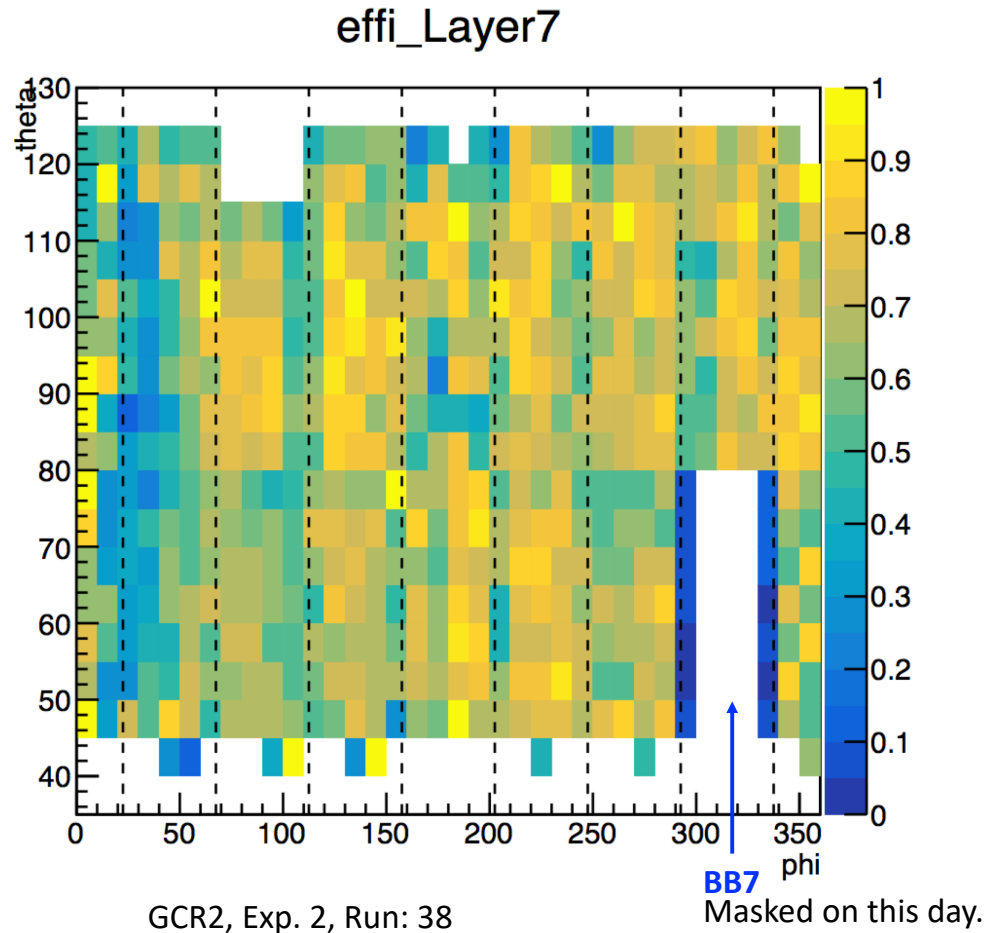
Inspection of FEE crates

BB0 Location



During last weeks maintenance day a crew (P. Branchini, R. de Sangro, Z. Stottler) inspected crate BB0, confirming an issue with the power supply voltages. Unfortunately BF4 is completely unreachable.

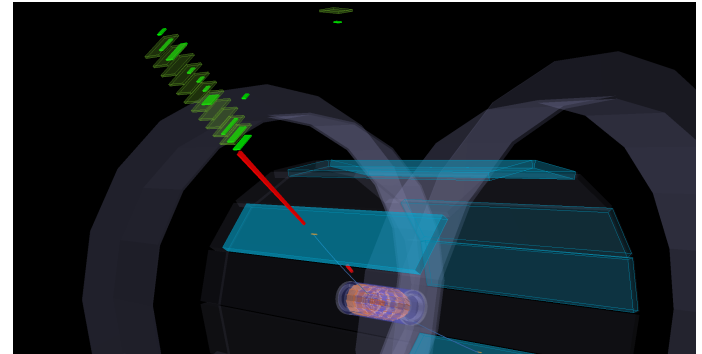
Efficiency map in GCR2



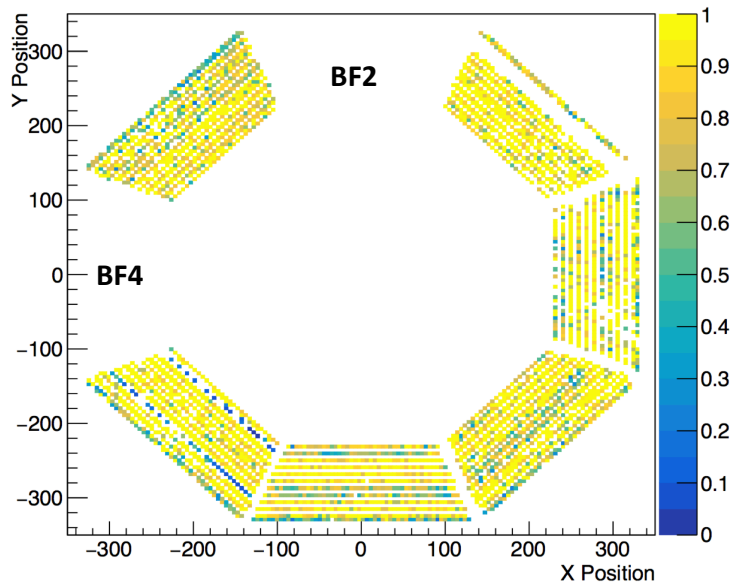
Efficiency has deteriorated since GCR2. FEE crate power limitations supply issues are creeping in.

BKLM standalone efficiency

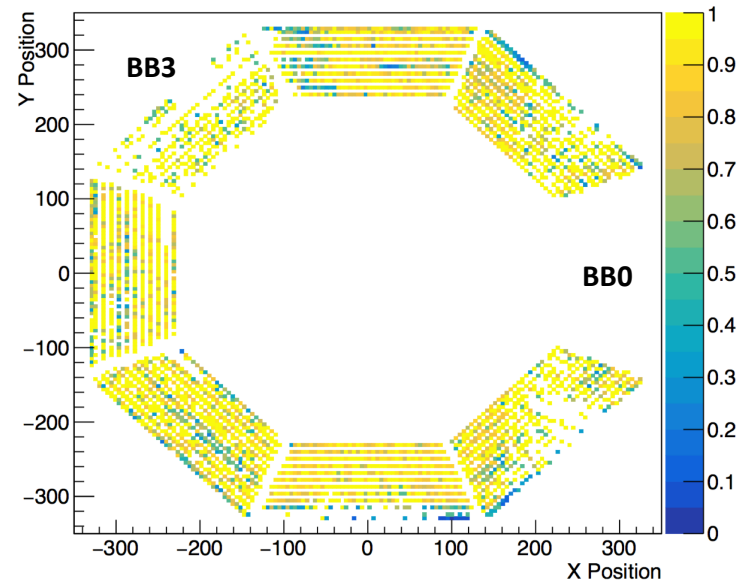
- Fraction of events in which a hit, expected on a BKLM-only reconstructed track, is actually found.
 - 90% or more on most of the detector



BKLM Standalone Efficiency - BF Sectors



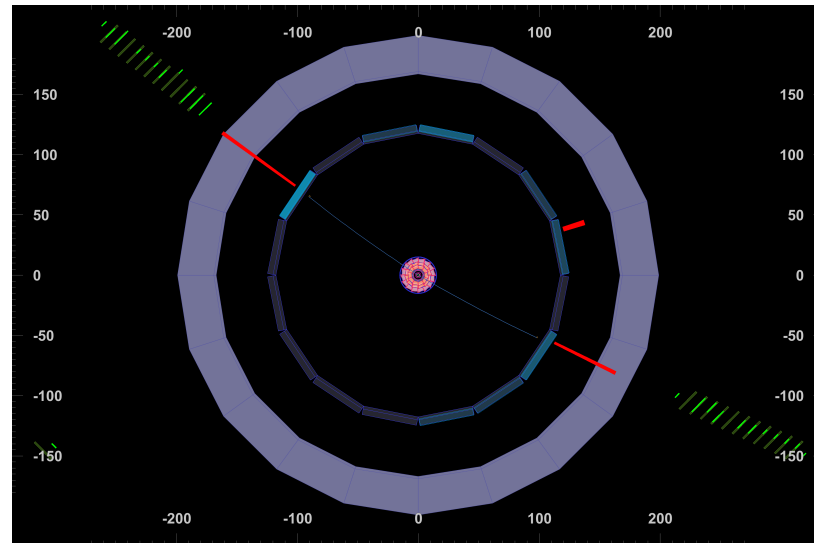
BKLM Standalone Efficiency - BB Sectors



Exp. 3 Y(4S), run 1937

CDC matching efficiency

- Extrapolate CDC tracks into the BKLM volume
- Determine hit positions in each layer
- Match BKLM hit with track hit if distance $< d_{\max}$ (20cm presently)
- Efficiency defined as $\epsilon = N_{\text{matched}} / N_{\text{extrapolated}}$

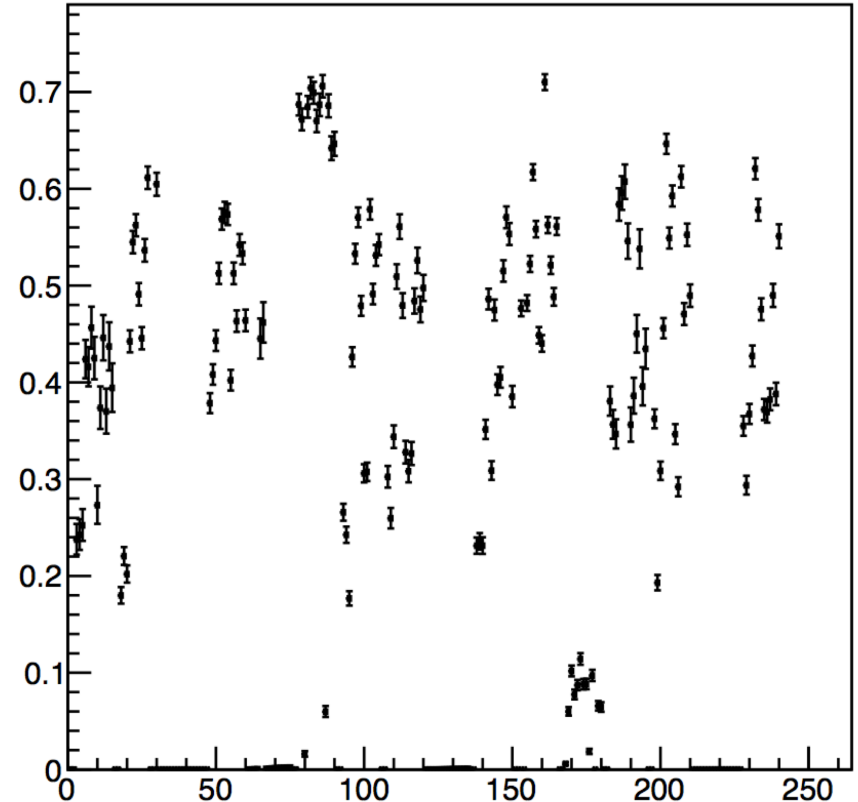


ϵ_{match} vs. module number - GCR3

Not great.

However, note that:

- no cuts on track quality
- tracking algorithm not optimized for cosmics (AFAIK)
- swimming in the top part of BKLM assumes track from the wrong direction



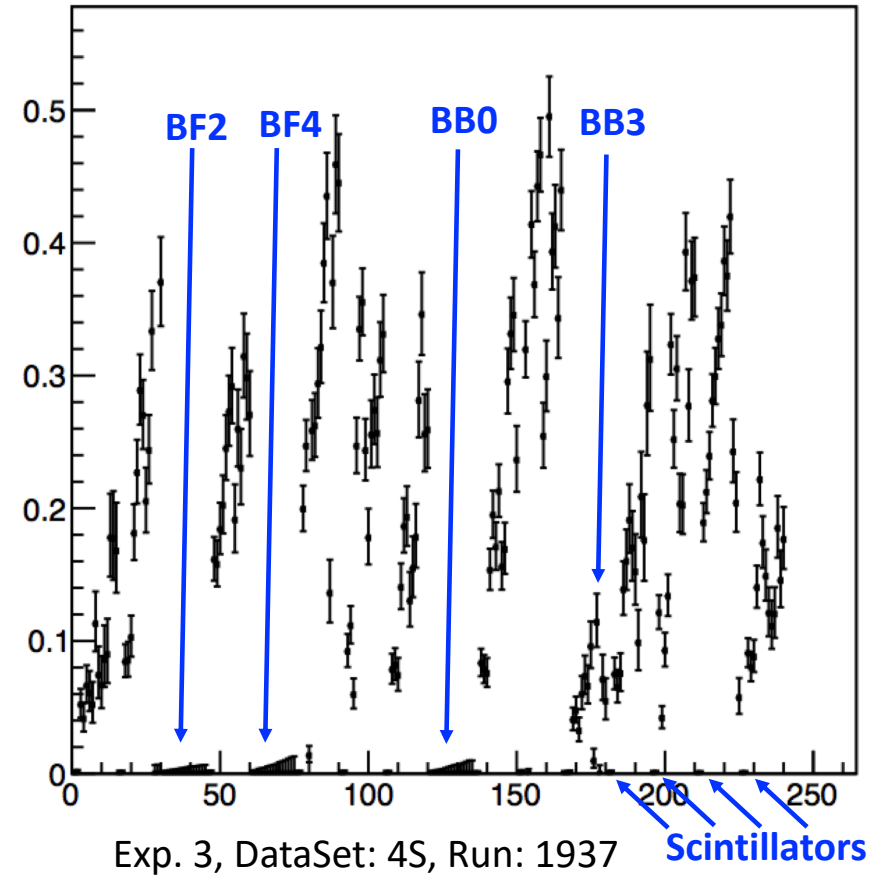
Exp. 3, DataSet: GCR3, Run 1613

ϵ_{match} vs. module number - Y(4S)

Not great.

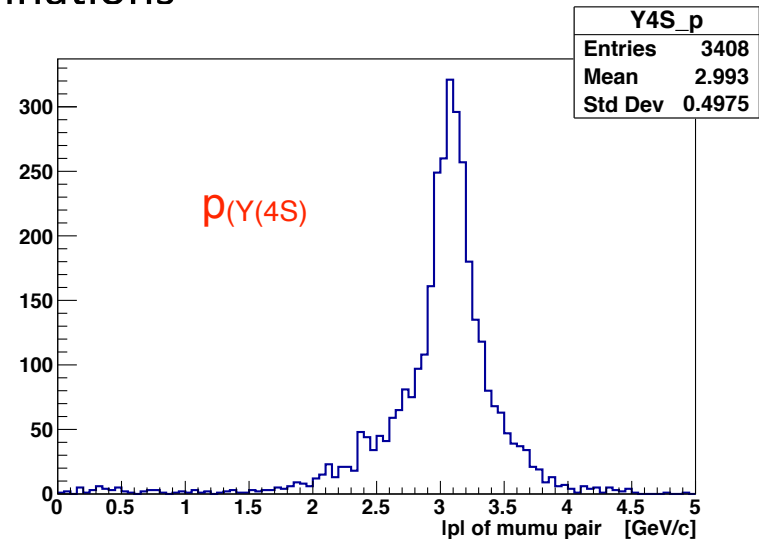
However, note that:

- no cuts on track quality
- tracking algorithm not optimized for cosmics (AFAIK)
- swimming in the top part of BKLM assumes track from the wrong direction
- sample contaminated by hadrons



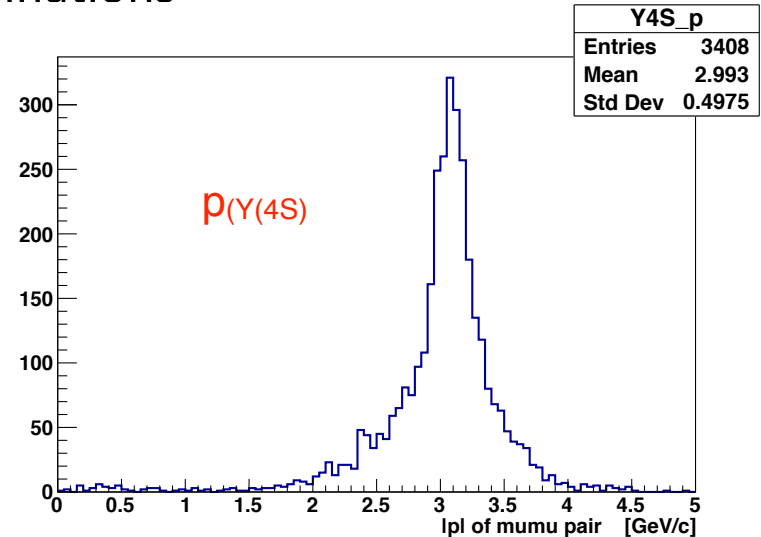
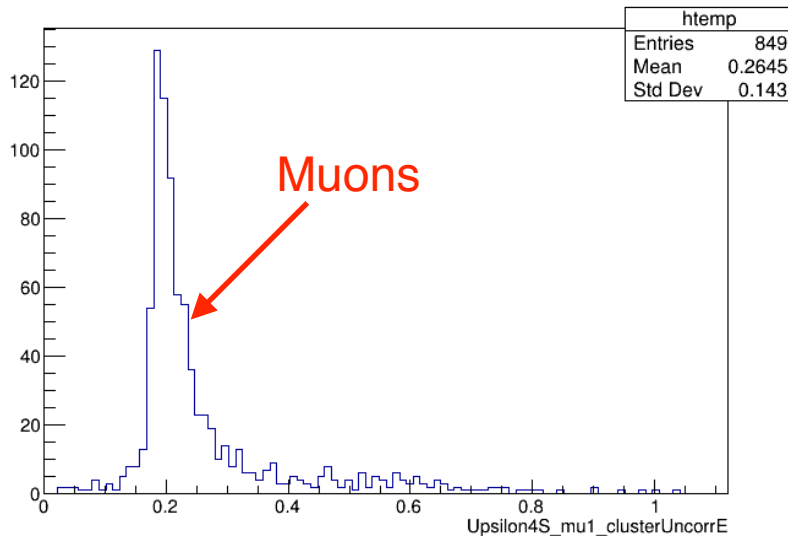
Selection of a pure muon sample

- “Official” di-muon sample has large contaminations
- First attempt to a dedicated selection:
 - fit 2 opposite-sign tracks with
 - $|p^*| > 4.5$ GeV
 - M_{mumu} (GeV) $\in [8, 12]$



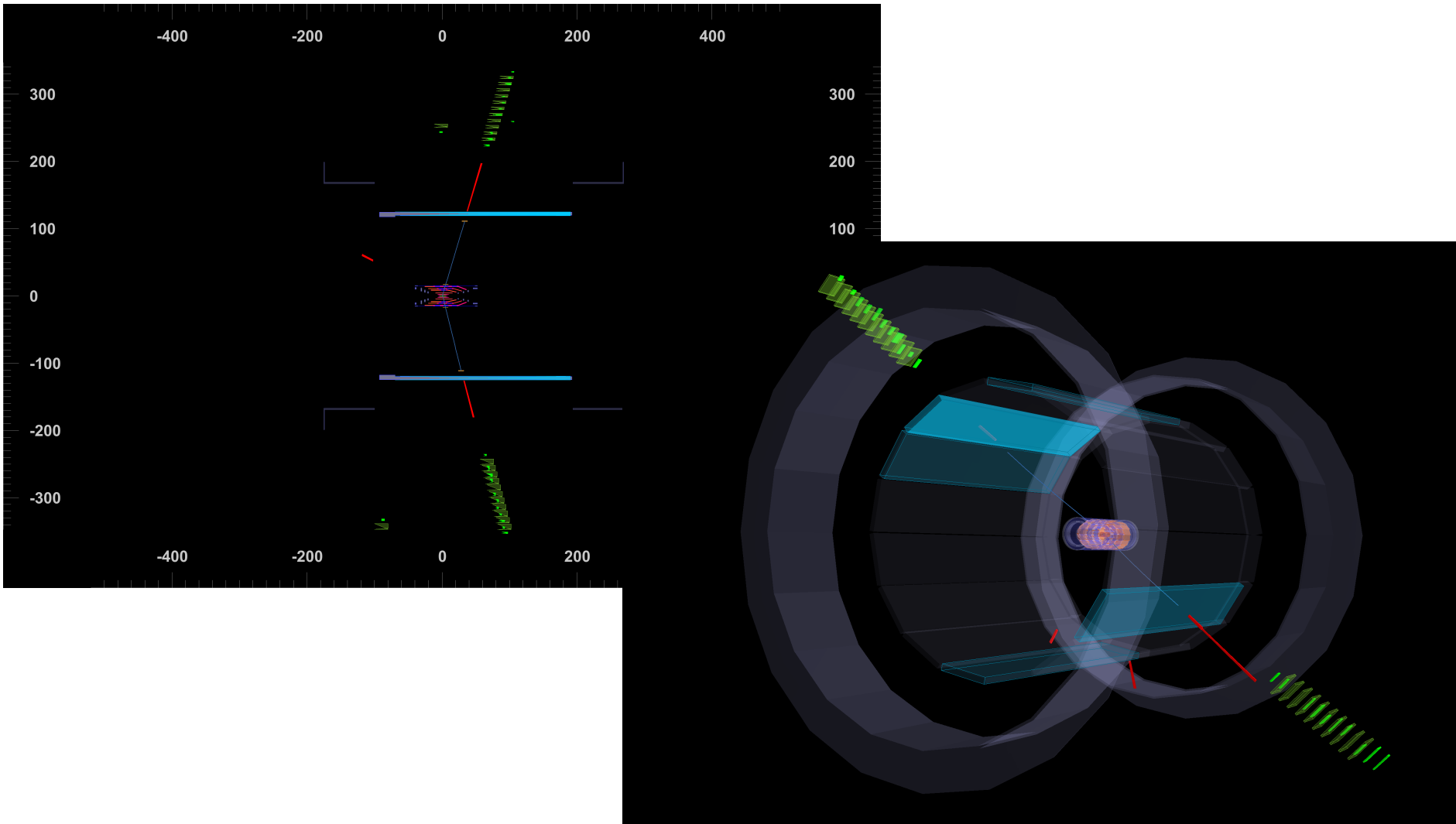
Selection of a pure muon sample

- “Official” di-muon sample has large contaminations
- First attempt to a dedicated selection:
 - fit 2 opposite-sign tracks with
 - $|p^*| > 4.5 \text{ GeV}$
 - $M_{\text{mumu}} (\text{GeV}) \in [8, 12]$
 - $E(\text{higher crystal}) < 1 \text{ GeV}$



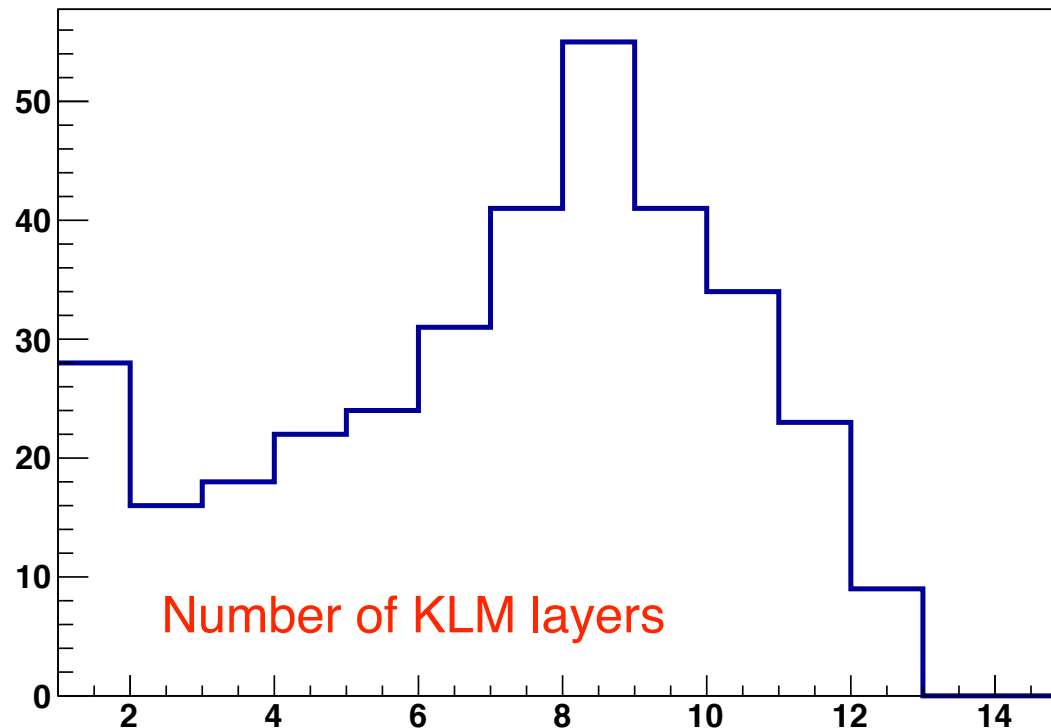
Selection of a pure muon sample

- Indeed, clean dimuon events with BKLM hits are selected



Selection of a pure muon sample

- However, final sample is small == > need much larger statistics for detailed KLM studies



Conclusions

- BKLM smoothly participating in the global runs, however:
- One crate is currently masked — probably a DC issue
- Two more FEE crates do not work, due to power supply issues, (unrecoverable during phase 2)
 - current plan is to replace *all* crates between phase 2 and phase 3
- Evaluation of BKLM efficiency is underway
 - gross features can be easily spotted, but procedures for efficiency determination must be improved
 - the Italian group has recently joined the effort
 - very large data samples are needed