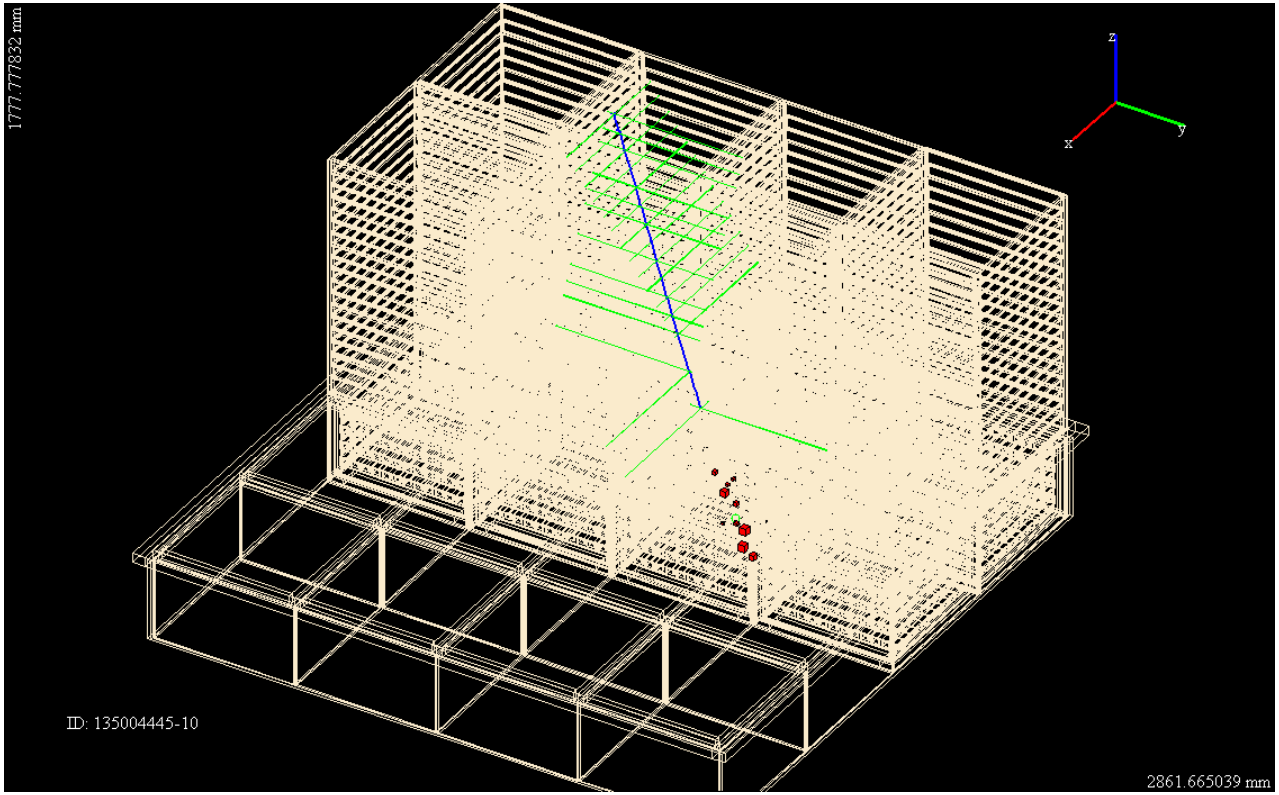
TriggerAlg (CAL) And Real Data



Anders W. Borgland

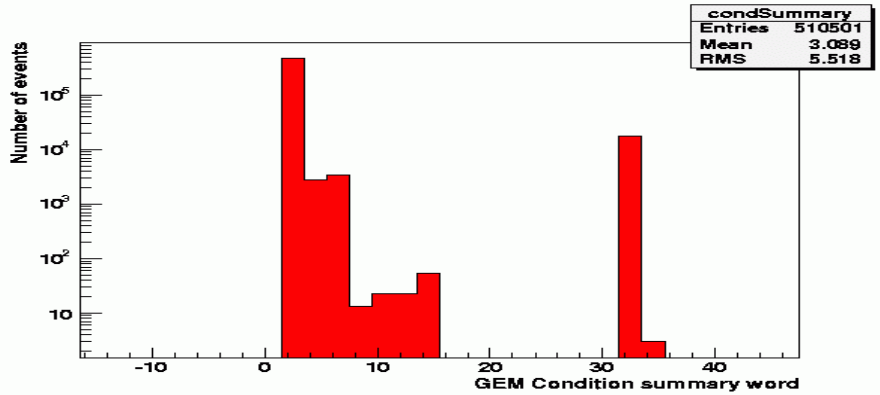
Science
Verification,
Analysis and
Calibrations

GEM, TriggerAlg (CAL) And Real Data

Trigger

GEM condition summary word. The word is deduced by combining bit patterns from the following table. For example, an event with both the TKR trigger bit and the CAL low trigger bit set in GEM has the condition summary word of $2^2 + 2^1 = 6$

GEM:
CAL LO: 6318
CAL HI: 112



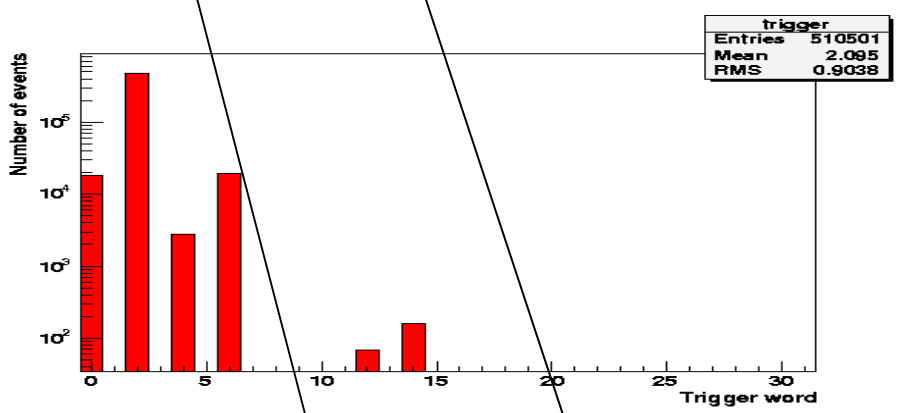
8 tower
B2 muon run

Condition summary word in GEM

Trigger bit	0	1	2	3	4	5	6	7
Summary	ROI	TKR	CAL Low	CAL High	CNO	Periodic	Solicited	External
No. of events	0	489814	6318	112	0	17855	0	0

Trigger word calculated by triggerAlg. The word is deduced by combining bit patterns from the following table. For example, an event with both the TKR trigger bit and the CAL Low trigger bit set has the Glt word of $2^1 + 2^2 = 6$

TriggerAlg:
CAL LO: 22194
CAL HI: 227



Trigger bit used in triggerAlg calculation

Trigger bit	0	1	2	3	4	5
Trigger	ACD Low	TKR	CAL Low	CAL High	ACD High	THROTTLE
No. of events	0	489361	22194	227	0	0

TriggerAlg (CAL) And Real Data

- I will only talk about the CAL part of TriggerAlg!
  - TriggerAlg 'simulates' the trigger word in MC and real data
- No GEM simulation!
- Real data:
  - Large discrepancies (factor 2-3) between GEM and TriggerAlg:
    - CAL LO
    - CAL HI
- Cause is understood:
  - EngineeringModel version of TriggerAlg (CAL) uses old code and wrong constants:
    - Pedestals too low
    - Causes increased number of CAL triggers
  - Corrected in GR.
  - Will be included in the next EM.
- But .....

TriggerAlg (CAL): Where to put it?

- For simulations:
  - TriggerAlg currently runs as part of making digis!
    - Can simulate effect of direct deposits in diodes:
      - » 1/ CAL HI and no CAL LO!
      - » 2/ CAL HI and xtal not read out!
- On real data:
  - Must run TriggerAlg on the digis:
    - Can reproduce case 1/ only in 4-range readout mode!
    - Can never reproduce case 2/:
      - » Equivalent to TriggerAlg TKR six-in-a-row trigger never firing if only 5 hits were read out.
    - Works fine for 'normal' triggers (deposit in xtal)!
- It makes sens to compare:
  - TriggerAlg from simulations
  - GEM from real data
- Do we (still) want to compare:
  - TriggerAlg and GEM both on real data?

Running TriggerAlg On Real Data

- If we want to compare:
  - TriggerAlg from real data
  - GEM from real data
- Two possibilities:
  - Move TriggerAlg to post-digi:
    - Also for simulations!
      - » Big drawback: Decreased performance – some real life cases can no longer be simulated (direct deposit in diodes)!
      - » 'Normal' CAL triggers can be simulated post-digi.
      - » No effect on TKR part of TriggerAlg (I think)
  - Keep TriggerAlg in digi making for simulations:
    - Add a second and separate TriggerAlg CAL algorithm:
      - » For data only
      - » Running on digis
      - » Drawback: Will not be identical to TriggerAlg in simulations, nor as performant!

Do We Want To Run TriggerAlg On Real Data?

- Not clear what we gain by running TriggerAlg (CAL) on real data.
- Must either:
  - Move TriggerAlg in simulation to post digi
    - Makes the simulation worse for the CAL!
  - Add a second and separate TriggerAlg for data only:
    - So we could end up comparing apples and oranges ....
- Comparisons can (should only?) be done:
  - TriggerAlg from simulations
  - GEM from real data
- Proposal:
  - Not run TriggerAlg on real data!
  - Not clear what we gain by doing it:
    - Possibilities for confusion when making comparisons between TriggerAlg (CAL) and GEM on real data