L1Calo involvement in the Trigger Signature Groups

L1Calo Joint Meeting

Cambridge: 23th – 25th March

Rainer Stamen
Kirchhoff-Institut für Physik
Universität Heidelberg

- Review and Examples from 2010
- Why and how?
- What to do in 2011?

Slide inspired by Juraj and Obama

Yes, we should!

Trigger Signature Groups

- Mandate:
  - Involve/recruit all ATLAS collaborators interested in trigger development and studies. This is not a restricted forum.
  - Maintenance (including bug fixes, required upgrades, new feature requests) of the High Level Trigger Algorithms
  - Performance optimizations of HLT algorithms, including trigger performance, optimizations with respect to CPU, memory usage, EDM size and other computing resource needs. Trigger performance optimizations may be based on improving selection requirements, determination of optimized calibration constants for online use to improve trigger performance,
  - Development and study of alternate algorithms and comparison with baseline algorithms
  - Validation and testing of HLT algorithms.
  - Study of L1 and HLT trigger efficiencies for baseline triggers
  - Proposal for new triggers
  - Development and studies of all triggers pertaining to the signature group, including their validation, comparison with simulations.
  - Understanding the behavior of triggers in debug streams.
  - Monitoring the performance of triggers at Point 1 and associated data quality assessment.
  - Providing on-call experts to be available for daily operations.
  - Close coordination with the Combined Performance Groups.
  - Representation of ATLAS performance groups in relevant trigger coordination bodies.
  - Weekly or bi-weekly meetings involving all relevant people in ATLAS.
  - Reports to the Menu/Performance Conveners

Trigger Signature Groups in Practice

- Ensure the running of the trigger chains
- Monitor and optimise the performance
- Focus point for physics and CP groups for trigger studies

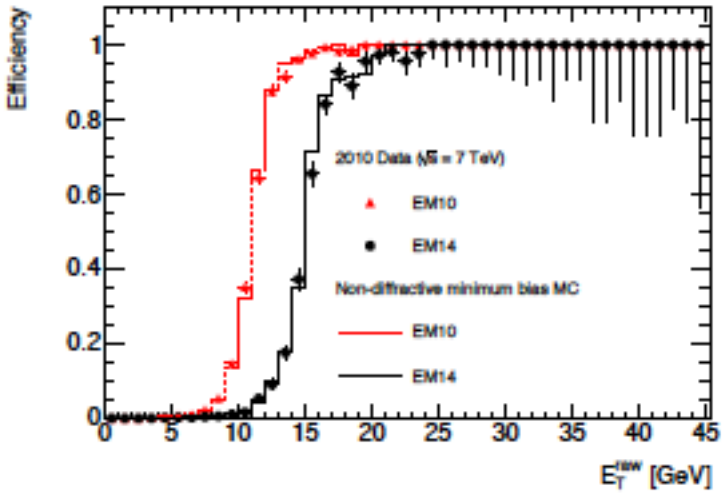
- Since there is a L1 component in the trigger it might be a good idea to have L1 people involved

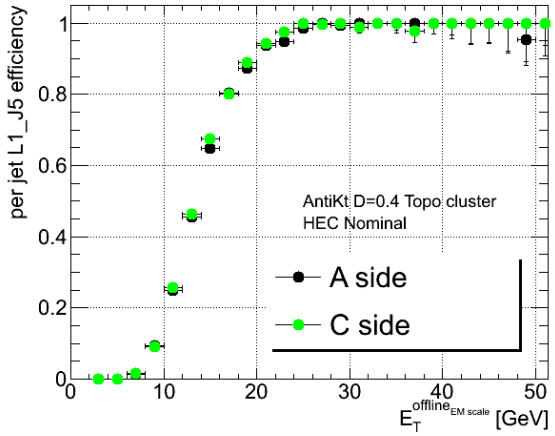
Our involvement in 2010

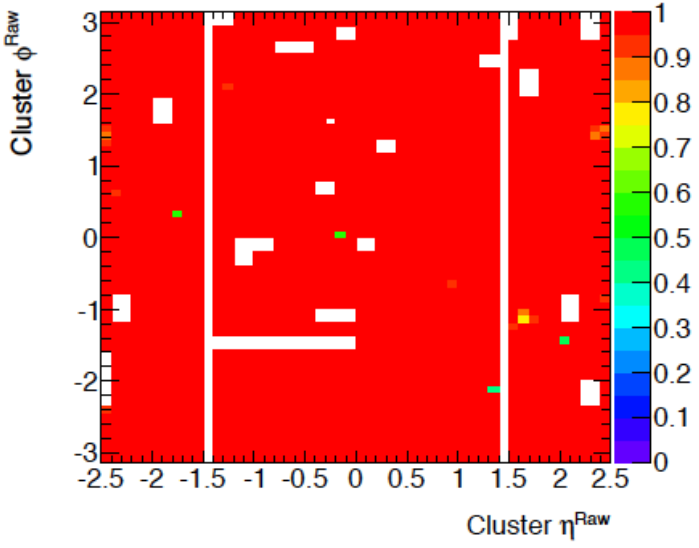
- e/gamma
  - Michele, Hardeep, Juraj, Taylor, John, Rainer
- Jets
  - Samuel, Sahill
- E_{Tmiss}
- Tau
- Bjets

Alan

Examples of „L1Calo Contributions“







L1 efficiencies

- Often done by L1Calo members
- Rather straight forward
- Does not need detailed knowledge about L1Calo

Examples of „L1Calo Contributions“

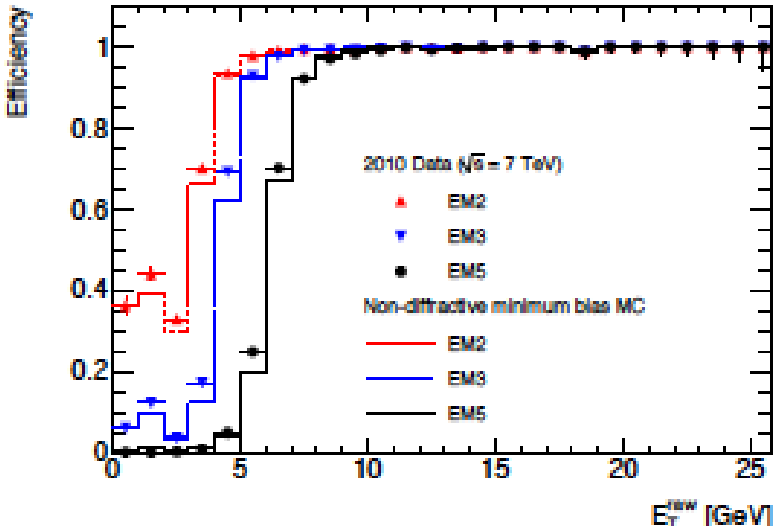
Understanding the bump:

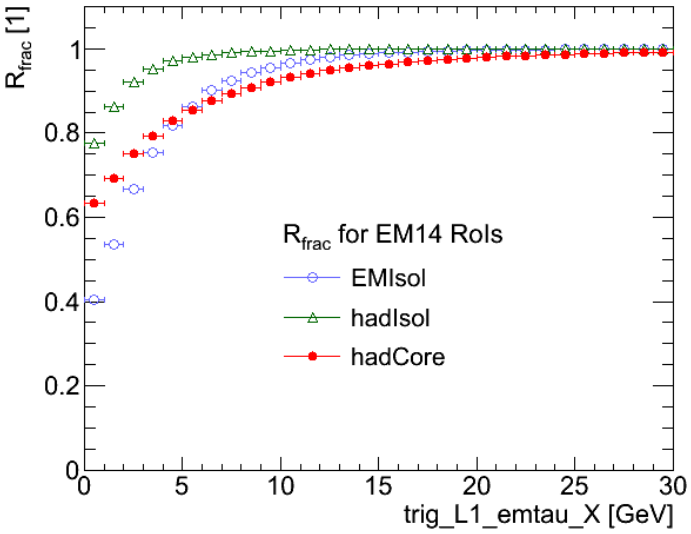
- Initial study by non-L1Calo person was incomplete
- Detailed study by Hardeep gave the full picture

Evaluating Isolation:

- study done by Michele in a few days
- Study by a non-L1Calo person took longer

Certain level of L1Calo knowledge and tools needed to perform this study





Why and how should we involve in the TSGs?

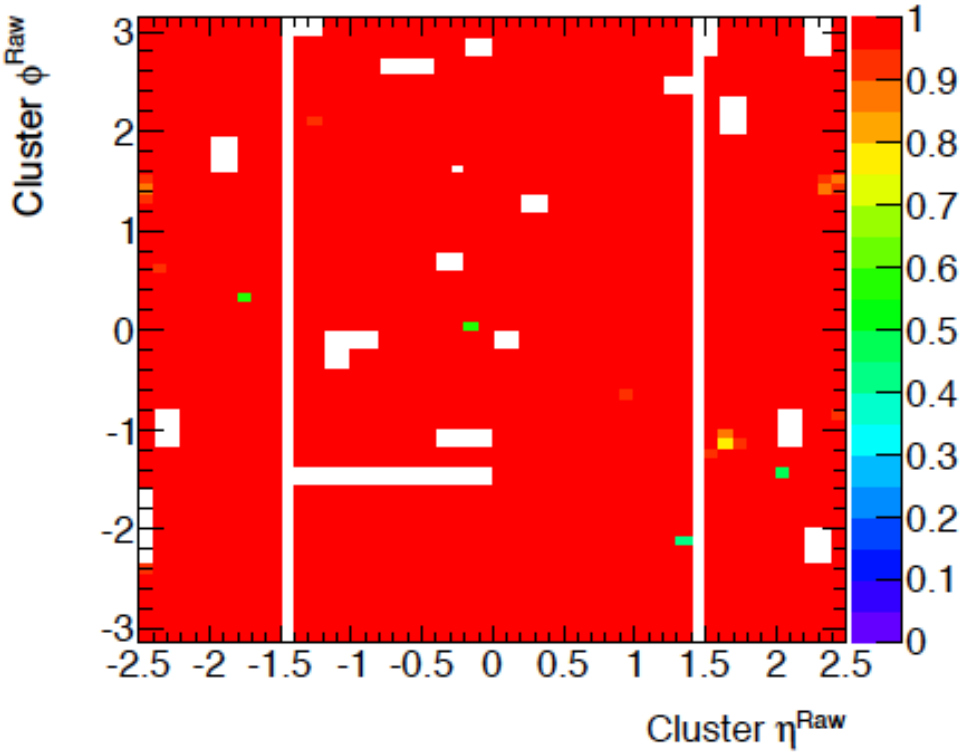
- We don‘t have too many people who could get involved in the four relevant Trigger Signature Groups.
- We should involve in the TSGs and sign-up for really L1 specific studies (things beyond plotting turn-on curves).

Topics of 2011 performance analysis

- The technical comissioning is done
- Stable running is a major task (done by CERN residents)
- Now we have to understand and optimise the physics performance (can be done from remote)
- 2011 will be very different to 2010
- Studies in the interest of the TSGs and L1Calo
  - Rates and efficiencies (understanding them!)
  - Pile-up (in time and out of time)
  - Optimisation of the L1 turn-on
  - Calibration – dead material
  - Noise cuts
  - Isolation
  - ...

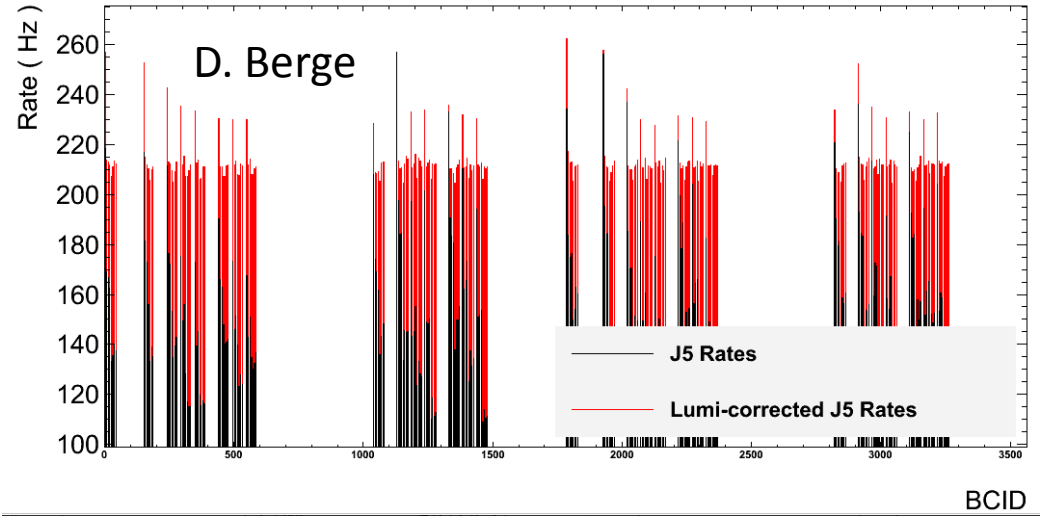
Topics for 2011: L1 inefficiencies

- Need detailed understanding of inefficiences
- Correlation of inefficent regions with Calo/L1Calo hardware failures
- Example from 2010:
  - Inefficient regions correllated to Calo and L1Calo problems



Topics for 2011: Pile-up

- Pile-up (in time and out of time)
  - Will certainly influence rates and efficiencies
  - Depeneds on
    - bunch structure
    - Proton current
    - Focussing
    - ...
  - Different effect for different signatures



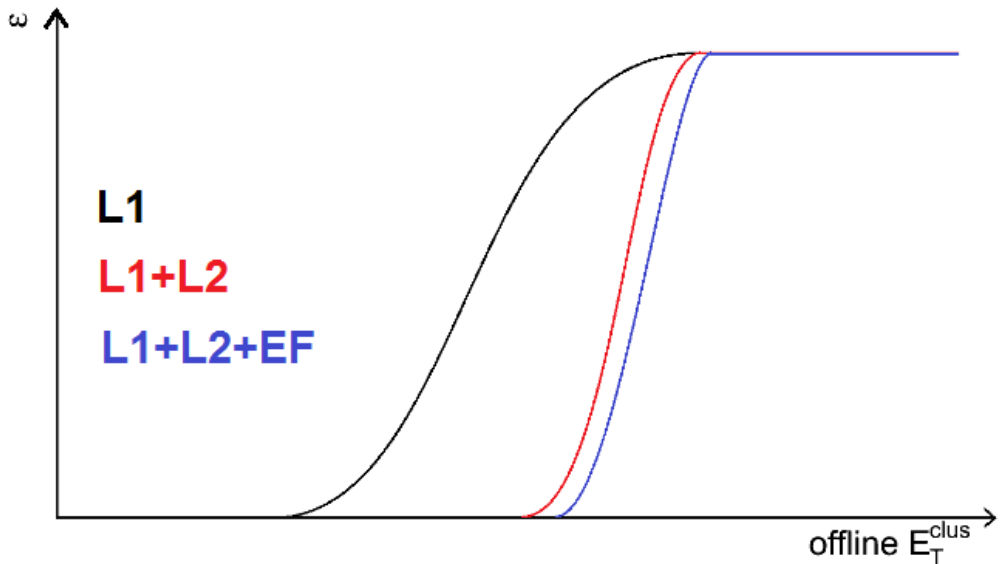
We started to study pedestals and we see similar effects (unfortunaly the student is sick to provide me the plot)

Topics for 2011: Turn-on optimisation

- L1 rates might hit limits
- Possible reactions
  - Higher ET cut (-> loss of physics)
  - Isolation (-> might be dangerous)
  - Sharpening the turn on (-> needs better calibration, maybe dead material correction?)

e.g.: e20_medium

-> L1_EM14
-> L2_e20_medium
-> EF_e20_medium



Communication

- Communication with the trigger management is probably good
- Communication with the TSGs probably not good enough
- The other day in a physics meeting (with half of the ATLAS top level management present):
  - „... this is because of a timing problem in L1Calo ...“
  - „... L1Calo does not work in the overlap region ...“
  - ...
- I believe we have a very good system, but we need to improve our PR division

Conclusion

- Trigger signature groups are a central component of the Trigger
- We have been contributing in the past
- We should continue and extend our efforts in the interest of the TSGs and L1Calo
- We will seen many new features in 2011
- Many of the studies lead to information necessary for upgrade discussion