Organisation of the Beatenberg Trigger Workshop

Ricardo Gonçalo

Higgs WG Meeting - 22 Jan.09

Trigger Workshop, 2-6 February

2-6 February 2009 | Dorint Blüemlisalp, Beatenberg, Interlaken

https://twiki.cern.ch/twiki/bin/view/Atlas/TriggerWorkshop2009
http://indico.cern.ch/confRegistrationFormDisplay.py?confId=44626

- Session 1: operations (including experience from 2008 run) – Monday 2 Feb.
  - Review of menu-wide issues related to actual operation: what happened/how long it took to implement, test, deploy new menus? What problems affected the trigger operation?
- Session 2: trigger motivation – Tuesday 3 Feb.
  - Understand what is at stake in each trigger: What physics/detector commissioning/monitoring do they serve? What can be prescaled? How rates can be controlled? What other triggers are related and how?
- Session 3: rate and resource measurement and management – Wednesday 4 Feb.
  - Review the existing tools to estimate resource usage: how much does a new trigger cost? How close are we to the limit? How best to predict the cost of a new trigger?
- Session 4: trigger menu evolution – Wednesday 4 Feb.
  - How to get a trigger online? How it evolves with changing luminosity? Who decides and based on what information?
- Session 5: trigger efficiency – Thursday 5 Feb.
  - How to determine the efficiency and bias for each trigger? What analysis data is needed for this? How much luminosity is needed for this?
- Session 6: complements and closeout – Friday 6 Feb.

Session 2: Trigger Motivation(s)Session

- Each trigger needs to be justified based on physics / performance / calibration / commissioning (as appropriate). This includes expected rates and efficiencies, as well as a ranking of priority, e.g. "never ever even consider a prescale", or "prescale only above luminosity of ...”
- This justification should also describe the key characteristics of the trigger, i.e. which requirements are more important than others. E.g. for a Z’->ee search, the pT threshold is less critical than L1 isolation.

Questions for each trigger:

- **Which commissioning/calibration/performance/physics studies use this trigger?**
- **What are the physics control channels for these studies?**
- **Will these use the same trigger? If not, how will the control sample(s) be triggered and "mapped" to the physics channel?**
- **Which parameters (threshold, isolation, etc.) are more important given the trigger's purpose?**
- **What is the impact of changes in the values of these parameters on the physics goals?**
- **Does this trigger use an algorithm which is very similar to that of another trigger? If so, what are the differences? Is this needed or could the triggers share an algorithm?**
- **Can this trigger be prescaled? If no, why not?**
- **What should its priority be in terms of prescaling? Only at highest luminosities?**
- **If this trigger cannot run for some reason, what are the primary and secondary fallback triggers? Why?**
- **Does this physics/performance/calibration/commissioning topic have a specific range of application? For example, are 10^6 events all that's needed?**
- **For specialized data: Are special runs ok? Or does the data need to be taken continuously?**
- **How stable is this trigger expected to be if pile-up effects or other backgrounds are different from expectation?**

Higgs WG contribution

- The Higgs group can contribute directly to session 2: Trigger Motivation
- Unfortunately, the talks were organized with a focus on the trigger slices and no space to present a single contribution from physics groups
- This means that the Higgs WG input will need to be spread across several talks

09:00->*12:30* Trigger Motivation (Convener: Kevin Einsweiler (

09:00	Introduction (10')
09:10	Requirements from initial physics measurements (20')
09:40	Requirements from combined performance (20')
10:10	Requirements from detector commissioning (20')
10:40	
11:00	Minimum Bias Triggers (10')
11:20	Electron/Photon Triggers (20')
12:00	Muon Triggers (15')

14:00->*18:00* Trigger Motivation (Convener: Kevin Einsweiler (

14:00	Jet and b-Jet Triggers (15')
14:30	Tau and ETmiss Triggers (15')
15:00	Combined Triggers (20')
15:40	
16:00	B-physics Triggers (15')
16:30	Forward Triggers (10')
16:50	Exotic Triggers (10')
17:10	Special Triggers (10')
17:30	Overview of Similar Algorithms - Code and Tunings (15')

Higgs WG contribution

- Proposal: after this meeting we'll have a good idea of the resultsof Higgs WG studies
- During next week, I can contact each speaker to point him/her to the material relevant
- This would be done in consultation with the authors of each study, Leandro and Ketevi, and the workshop organisers
- The aim is to make sure our trigger needs get noticed

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- The Higgs WG studies will also be important for other sessions
  - E.g. trigger evolution, where it will be important:
    - To know which triggers will be available at higher luminosity
    - To promote trigger stability – we need long running periods where trigger response stays constant

- The workshop is intended for discussion and contributions from the floor – should be used to make sure the Higgs needs are noticed
  - Several members of the group will be in Beatenberg, including Leandro

- Most of all, these studies are for our own information: to know what to expect from real data, where the trigger is always present…

Backup…

Proposed contribution from Higgs WG - I

For each analysis/channel:

- Determine the trigger efficiency for **signal** samples with respect to the offline selection (or reasonable preselection)?
  - **Be quantitative and clear**
  - Take **prescales** into account – see slide on available data below
  - Apply no truth/fiducial cuts at trigger level (don't make it look nice, make it real)
  - **Use several possible triggers** even if not optimal – The interesting question is: "How much data do we loose if we have to use this trigger?"
  - Useful to know: what is the offline (pre-)selection efficiency?

- What (if any) bias do you find in which distributions/measurements? (e.g. shift in estimated m_H with /without trigger)
  - Would help to understand if something needs to be improved on a given trigger

- How much luminosity will you need to have some sensitivity? (e.g. 1-2fb^{-1} for H -> WW; 10 fb^{-1} for ttH … approximate numbers are ok here)
  - Helps to understand what plan should be as luminosity increases

Proposed contribution from Higgs WG - II

The first priority is described in the previous slide, but…

- Most of the work next year will be on:
  - Studying and understanding the backgrounds
  - Discovering methods to determine bias, systematic uncertainties, and efficiencies (incl. trigger efficiencies), etc from real data

- It would be very useful to understand:
  - What triggers will be used to select any control samples, samples needed for performance studies, samples to study trigger and reconstruction efficiency
    - e.g. use electron and muon triggers to select ttbar background sample
  - How much statistics (i.e. integrated luminosity) will be needed to achieve the required precision
  - Most important issue is to suppress bias: don't use b-tag trigger if you need to study offline b-tagging efficiency

- As much quantitative information as you can provide: this will make it more likely that the right trigger will be there when you need it

Data for trigger studies

- In principle, there's no time to re-do data samples before workshop
- Use trigger menu available in data currently being produced (See Junichi's talk today)
- Data produced with release 14.2.20.3; centre of mass energy: 10TeV
- Geometry: ATLAS-GEO-02-01-00
  - http://atlas.web.cern.ch/Atlas/GROUPS/OPERATIONS/dataBases/DDDB/show_branch_tag_comments.php?tag_name=ATLAS-GEO-02-01-00
- Trigger Menu: lumi1E31_no_Bphysics_no_prescale
  - Prescales **not** applied in AOD – can be found from "lumi1E31_no_Bphysics" page: and corrected by hand (easy for single triggers, ask when in doubt)
  - Trigger menu pages: lumi1E31_no_Bphysics : http://tbold.web.cern.ch/tbold//view_menu.php?name=lumi1E31_no_Bphysics_14.2.20&tag=
  - lumi1E31_no_Bphysics_no_prescale : http://tbold.web.cern.ch/tbold//view_menu.php?name=lumi1E31_no_Bphysics_no_prescale_14.2.20&tag=

EF chains details

name	PS	PT	counter	Lower Chain	stream	signatures
EF_te650	1	0	141	L2_te650	physics. jetTauEtmiss x 1 physics. express x 1	2: EF_te650 x1
EF_g25_xe30	1	0	243	L2_g25_xe30	physics. egamma x 1 physics. express x 1	1: EF_g25calo x1 2: EF_g25id x1 EF_xe30 x1 3: EF_g25 x1 EF_xe30 x1
EF_mu4_j10_matched	1	1	457	L2_mu4_j10_matched	physics. jetTauEtmiss x 1	1: EF_mu4_j10_matched x1
EF_e10_mu6	1	0	241	L2_e10_mu6	physics. muons x 1 physics. egamma x 1	1: EFID_mu6 x1 EF_e10_loosecalo x1 2: EF_mu6 x1 EF_e10_looseid x1 3: EF_mu6 x1 EF_e10_loose x1
EF_MU4_Upsimumu_FS	1	0	322	L2_MU4_Upsimumu_FS	physics. muons x 1	1: EF_FStracks x1 2: EF_MU4_Upsimumu_FS_FStracks x1 3: EF_MU4_Upsimumu_FS x1
EF_g20_xe15	1	0	242	L2_g20_xe15	physics. egamma x 1	1: EF_g20calo x1 2: EF_g20id x1 EF_xe15 x1 3: EF_g20 x1 EF_xe15 x1