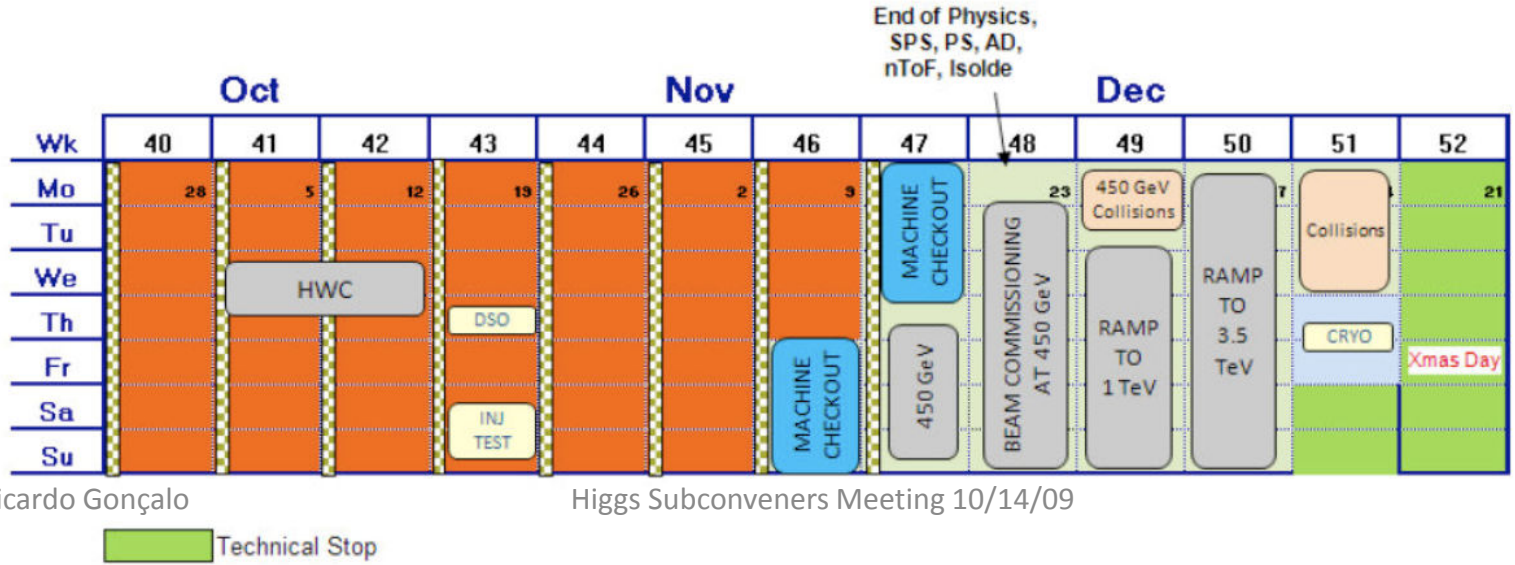
Higgs & Trigger for 2009/10 - I

- In several cases, the latest Higgs WG trigger studies are still the Beatenberg ones – this was an important milestone
- In the meantime: beam energy and luminosity expectations have changed, and trigger menu changed quite a lot
- ATLAS combined run (24h coverage) has started on Monday – week 42 – and collisions can be expected in ~1 month
- This is a good time to revisit the focus on the trigger
- The first step was asking for input from each sub-group – many thanks for the feedback!



Higgs & Trigger for 2009/10 - II

Next steps:

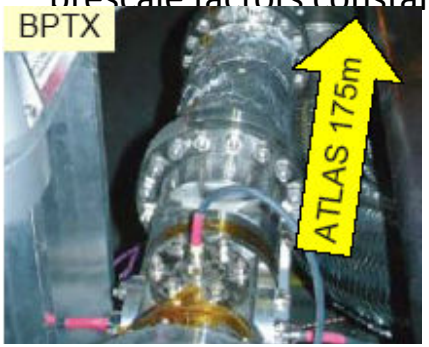
- To optimally organize effort I would like to propose that one person be identified for each analysis who is aware of the trigger needs of the analysis
  - Several Higgs sub-groups have trigger experts – probably no need to formalize things further in those cases
  - But in other cases it may be more efficient to nominate on person
  - I think this should be done (or not) depending on individual cases
  - Then I would be in touch with the contact person for anything needed and to be up to date on analysis issues

- Then, it will be a question of keeping an eye on how things evolve in data taking
  - I assume later part of 2009/10 run will be most interesting for Higgs group
  - But we'll need to get used to all issues connected with real data from the beginning

- Finally, will try to keep this page up to date: https://twiki.cern.ch/twiki/bin/view/AtlasProtected/HiggsWGTriggerPage
  And everyone informed of useful news

Commissioning plans

- Combined ATLAS cosmic run started on Monday 12th (TØ – 4 weeks) – all systems have now been integrated and we are running continuously – useful for testing detectors and reco
  - HLT in passthrough mode – exercise algorithms, event data, monitoring etc without rejecting events
  - Data streaming by the HLT based on Level 1 trigger type and on tracking/cosmic event algorithms
- Single-beam events to be selected with dedicated menu – roughly same as for 1st collisions
  - Based on use of beam pickup (BPTX) and minimum bias scintillators (MBTS)
  - Refine timing of signals from various detector systems
  - Continue to exercise HLT algorithms in passthrough mode using beam-gas events and halo muons
- Initial collisions triggered with Level 1 only – including 900GeV collisions
  - Significant amount of work on e.g. Level 1 calibration needs to be done with initial collisions
  - This data will be essential for commissioning of detectors, Level 1trigger, HLT selections
- HLT deployed to reject events only when needed to keep event rate within budget
  - Both Level 1 and HLT trigger prescales can be updated during the run to increase operational flexibility – prescale factors constant within luminosity blocks



Beam Pickup: at ± 175m from ATLAS
Trigger on filled bunch
Provide the reference timing

Minbias Trigger Scintillator:
32 sectors on LAr cryostat
Main trigger for initial running
η coverage 2.1 to 3.8

Menu evolution

- The evolution of the trigger menu is very much tied to the evolution of the LHC luminosity (and to the beam energy)
  - Several commissioning menus are being put in place for the initial beam period with detector and trigger commissioning as the highest priority
  - Procedures for menu evolution agreed but still need to be tested in real life

- Menus exist in Monte Carlo simulation for average luminosities of $10^{31}cm^{-2}s^{-1}$ and $10^{32}cm^{-2}s^{-1}$
  - These are possible scenarios for the coming run
  - Depending on the detailed bunch spacing scenario, this could mean up to 5 overlapping events per bunch crossing, on average – might require changes to the menu, in order to keep the rate manageable
  - These menus provide a reference for planning and evolving the online trigger menu as the LHC luminosity grows
  - Some high-p_T physics triggers, needed for analysis in channels with low cross section, are “un-prescalable”
  - These menus have been (and will be) evolving