# Testing new L1Topo Firmware

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**(in absentia)**
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- Physics vs L1Topo requirements
- Strategies for testing new firmware

# L1Topo Firmware Development?

- Physics/Trigger request
  - Very understandable desire to freeze L1Topo firmware and use stable version for physics - before MD/TS
- Conflict with L1Topo development plans?
  - Plan to implement and test a number of infrastructure FW changes before and during MD/TS (while Marek is at CERN)
    - Mainly input link handling and controller FPGA (use latest Xilinx tools)
    - Would also like to try and fix remaining algorithms if possible (KF-XE)
- Possible approach?
  - Freeze algorithm firmware but still update infrastructure
    - In principle unchanged VHDL with unchanged Xilinx tool should result in identical algorithm behaviour (if FW can be built within constraints) though may have small timing changes (ns level?) which we already check
    - But it would be good to have strategies for checking algorithms…

# Testing With Hot Towers

- Can use hot towers for checking algorithms
  - Have l1calo tool for sending various patterns of hot towers
    - Conceived for quick timing checks of new firmware without beam
    - Could also check algorithms vs simulation: need to add more patterns
  - Can also make 40 MHz hot TGC towers
    - So far only used for mapping checks, could add more patterns and fire them in combinations to test most algorithms
      - No RPC hot towers so cannot test "barrel only" items this way
  - Run in ATLAS partition with L1Topo items enabled and HLT at least running L1Topo simulation (no need for output?)
    - Requires bit correct L1Topo simulation for complete confidence

# Checking in ADJUST?

- Typically have 5-10 mins of good collisions in ADJUST
  - Calo items fully efficient, muons unfortunately not
    - I had thought muon standby mostly affected just FWD but it seems not
  - If L1Topo chains enabled with prescales to run simulation could make last minute checks before stable beams
    - Would need just a few minutes to fill appropriate monitoring plots
  - "White knuckle test": daytime, experts poised?!
  - In unlikely event of problems seen despite standalone hot tower tests could: pause run, kill L1Calo, reload L1Topo FW (6 mins) then TTC restart L1Calo (3 mins).
  - Probably would not make it in time before ATLAS READY but maybe still worth bearing in mind?

# Summary

- L1Topo wants to continue firmware development
  - Mainly infrastructure - before expertise starts to disappear otherwise we may be stuck with non-optimal FW
  - But could freeze algorithms ~now
  - Most infrastructure FW tests can be done between fills but at some point we might want to make a new stable FW for data
- Suggestions for testing algorithm stability in new FW
  - Better for calo than (more critical) muons
  - Both require moving to bit correct L1Topo simulation ASAP
    - Data quality is a third good reason for this making this change
- Discuss?