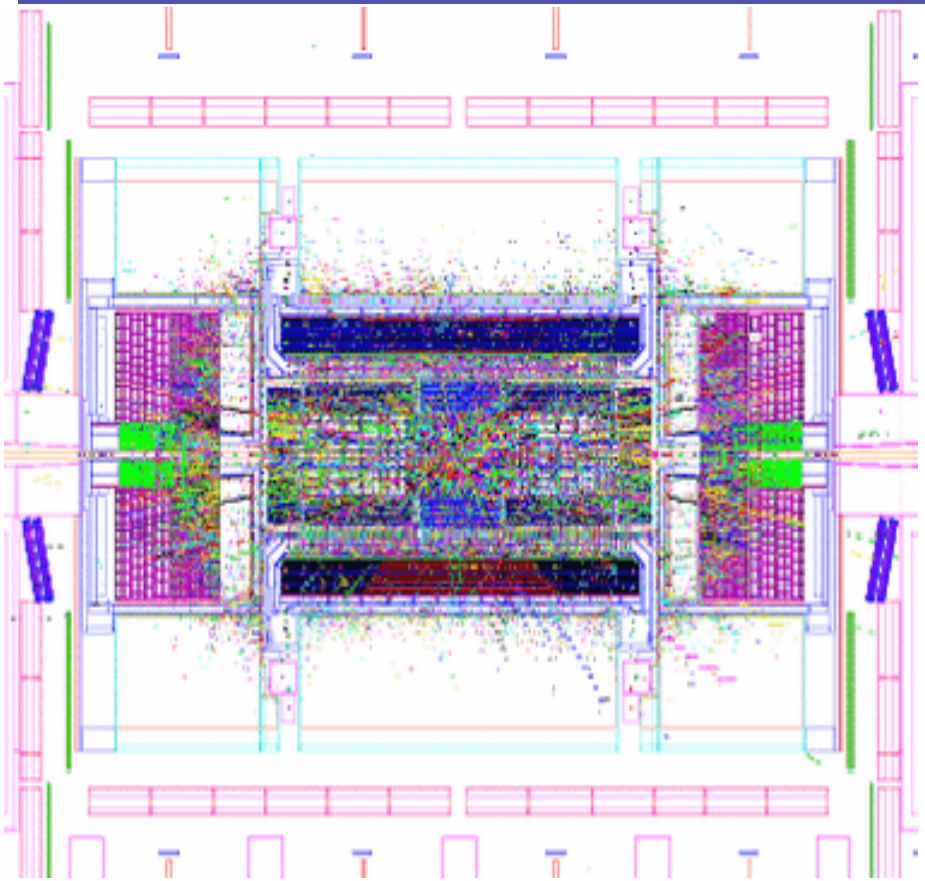
ATLAS Inner Tracker



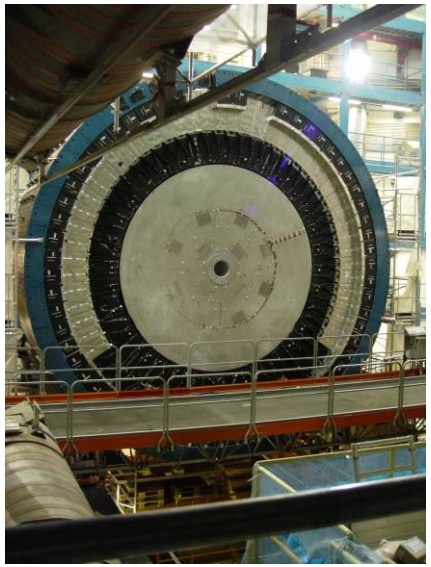
230 Events (25 ns BC at 10^{35} cm^{-2} s^{-1}) superimposed for Inner Tracker studies

- 12.5 ns would reduce occupancy compared to 25 ns case
- Current design is developed for 25 ns and should cope OK
- In principle could reduce the number of strips if we knew early on that we will definitly run at 12.5 ns
  - → But not as much as a factor 2:
    - Faster shaping time --> more noise
    - Bigger strips --> more noise
      - → --> Signal/noise is an issue at end-of-life
    - No difference in Jets (Pixels determined by this more than occupancy)
- So 12.5 ns is not a big advantage
- Much more afraid of 75 ns!

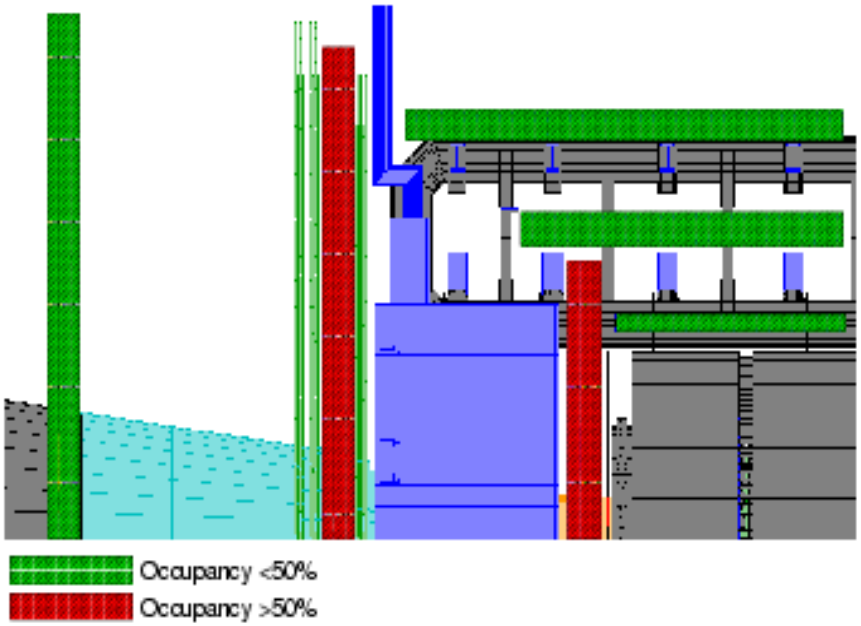
Simulations (physics and tracker performance) have so far been done for 25ns (230 min bias)

ATLAS calorimeters

- The forward region (LAr) might need upgrades (of the complete FCAL and/or HEC electronics) due to rates and radiation levels – and this would mean to open EC cryostats (big operation). The FCAL CORE costs are 3.5 MCHF. No link to BCO.
- If other BCO than 25ns (or maybe in any case), will need to change BE electronics to handle multiple filter constants – 5.5 MCHF
- If we decide to change also the FE it will cost 17 MCHF. Might be needed due to failures or to handle increased BCO frequency better.
- The calorimeter readout links are almost saturated, and a change would require redesign of both FE and BE (for example if we need to increase the LVL1 rate)
- 25 ns clearly easier than 12.5 for us – less changes are mandatory
- For the TILES we might want to change the electronics due to radiation levels (10 MCHF)



ATLAS Muons



In the worst-case scenario of extremely high rates the chambers in the inner and middle end-cap disk would have to be replaced by chambers with higher rate capability.

- 12.5 ns vs 25 ns does not affect muon system very much
- But no advantage for precision chambers
  - → Background is due to gas of low energy photons and neutrons
  - → Unchanged by BC frequency
  - → No change on what chambers need replacing
- Electronics changes needed for 12.5 ns in trigger
- RPC chambers can resolve which bunch even at 12.5 ns
- TGC cannot (reliably)... intrinsic resolution ~10 ns
  - → Readout two bunches?

ATLAS Trigger/DAQ and General

- For the LVL1 trigger, changing to 80 MHz would cost 5-10 MCHF - assuming we keep the current detectors in the trigger.
- For the High Level Trigger a cost estimate for custom parts at 10 MCHF is made, while the CPU farm is already subject to a 3 year replacement strategy.

General across ATLAS:

- In many places in the detector we have 40 MHz crystal oscillators and going away from this will costs (money – but mostly effort)

Physics simulations: hep-ph/0204087:

- The studies there were performed under the hypothesis that the readout electronics for both, calos and ID, will be the same (in terms of shaping/integration time) as today. So, essentially they have been made for a 25ns bunch spacing.