MDT Upgrade Needs for First Luminosity Upgrades

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MDT chambers at high rates

Nominal luminosity of the LHC: $L = 10^{34}$ cm^{-2}s^{-1}

- Occupancies in MDT chambers of up to 19% expected in the worst case.
- Occupancy limit of MDT chambers for segment finding: ~30% according to former GIF tests.

Ultimate luminosity of the LHC: $L = 2 - 3 \cdot 10^{34}$ cm^{-2}s^{-1}

- 2 to 3 times higher occupancies than nominal.
- Where may MDT chamber have to be replaced for these luminosities?

Predicted background rates (CERN-ATL-GEN-2005-001)

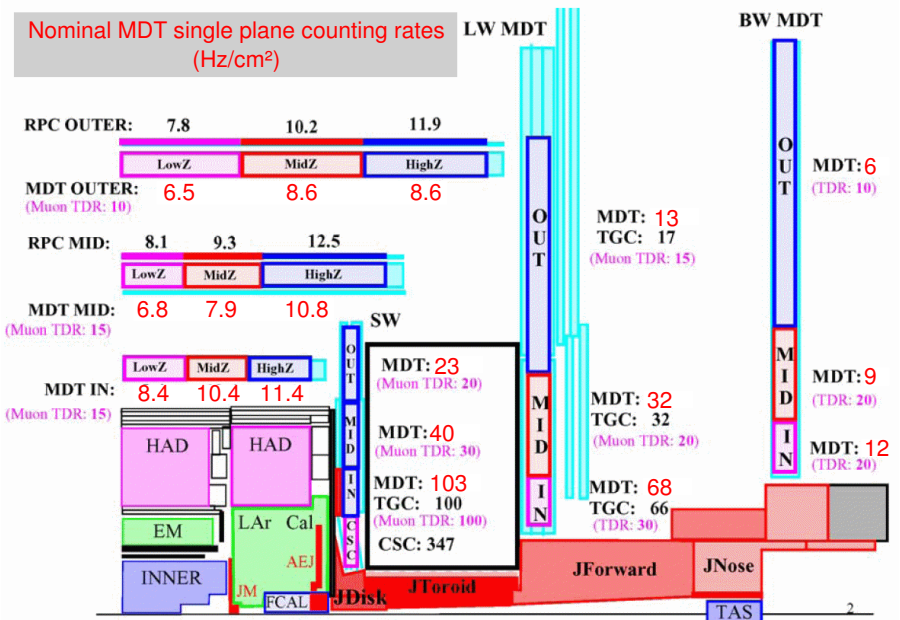
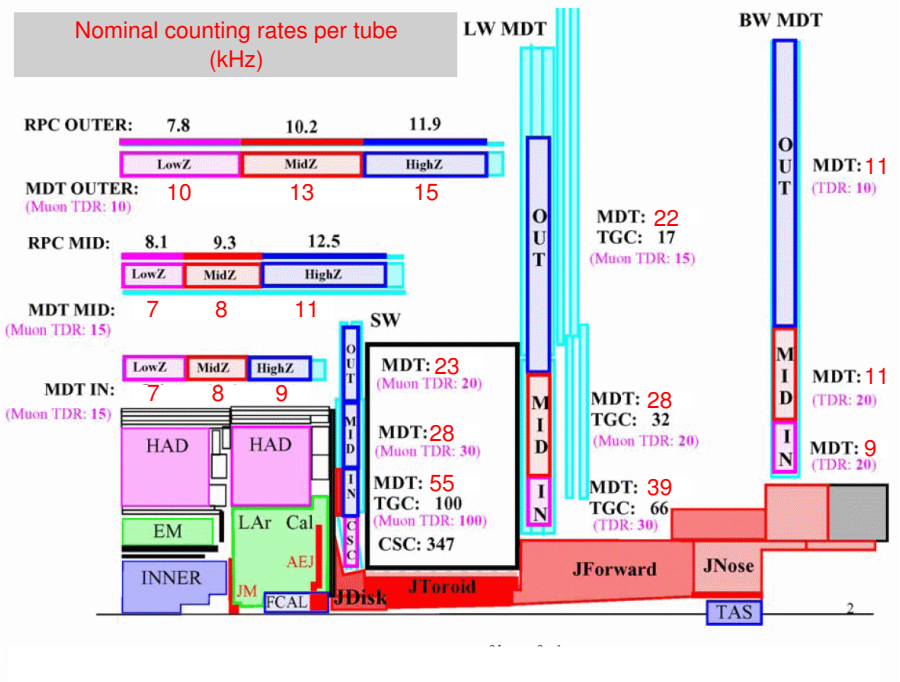
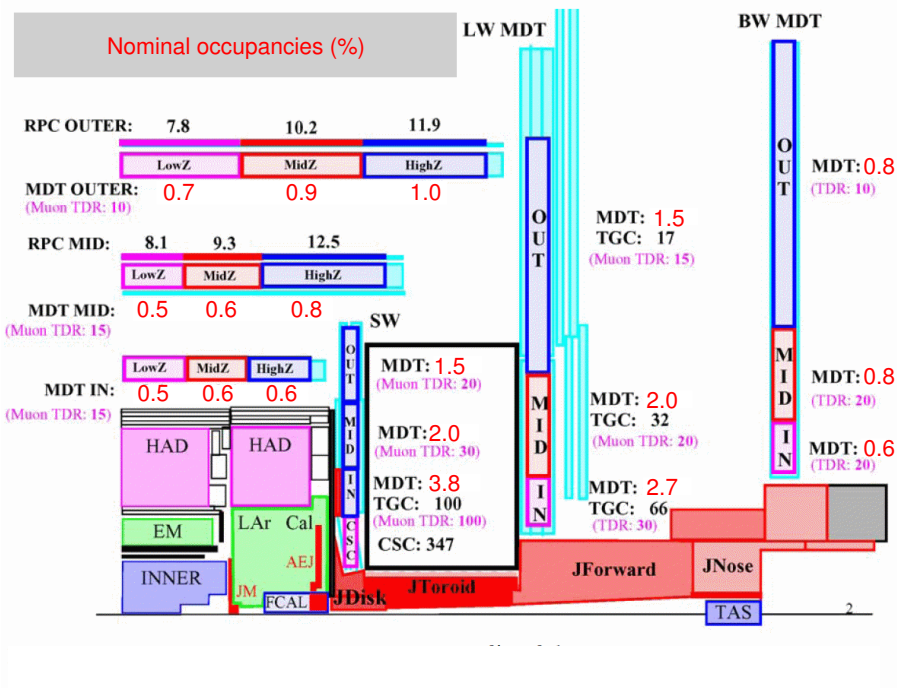


Fig. 4 Average single plane counting rate (Hz/cm2) at 10^{34} $cm^{-2}s^{-1}$ in various scoring regions. Values in parenthesis indicate the rates estimated at the time of the muon spectrometer TDR.

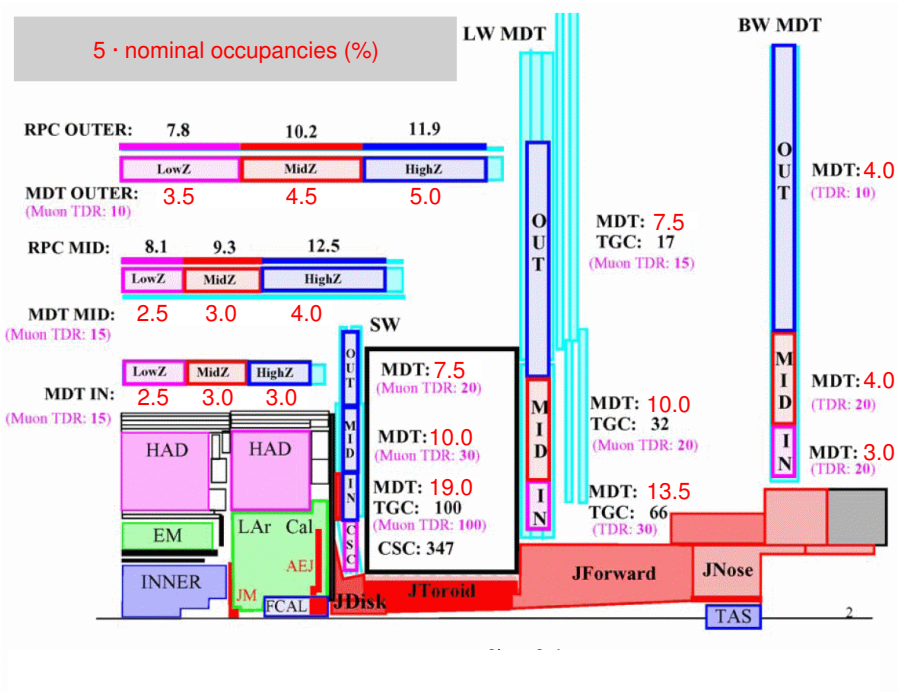
Predicted background rates for nominal luminosity



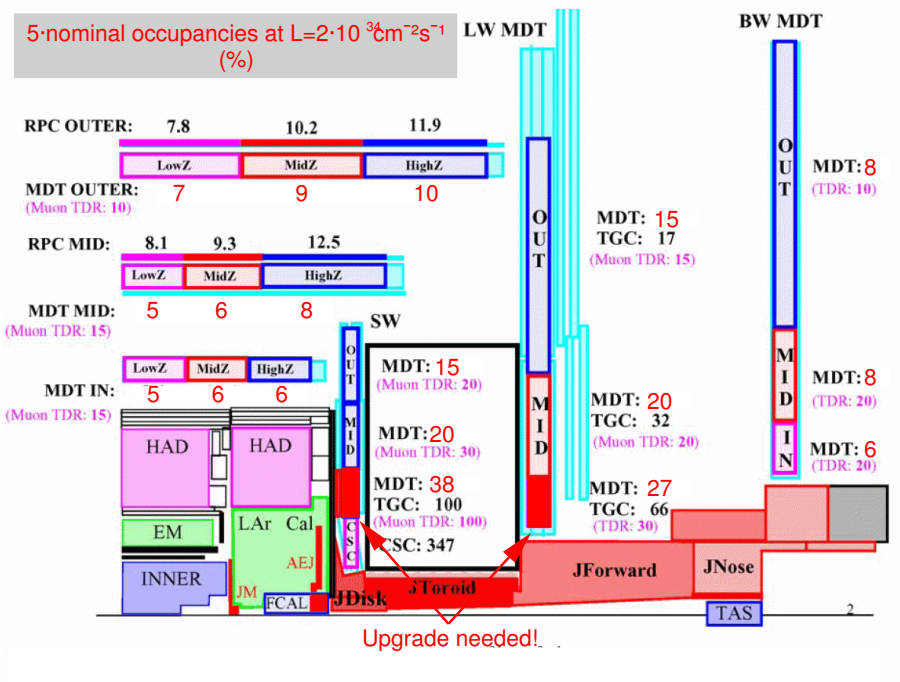
Predicted occupancies for nominal luminosity



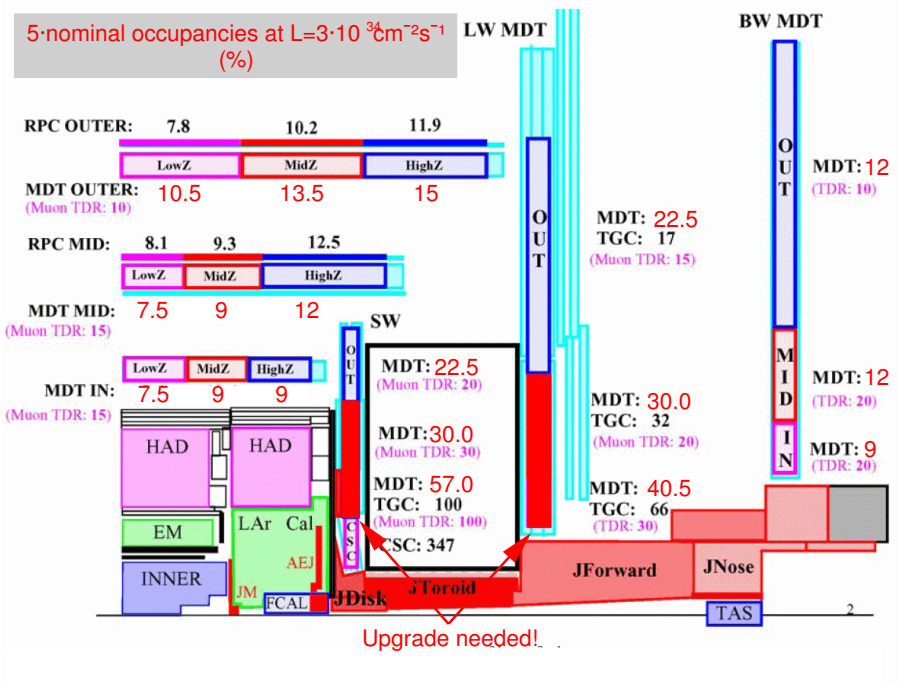
Predicted occupancies with safety factor 5



Predicted occupancies for 2· nominal luminosity



Predicted occupancies for 3· nominal luminosity



Conclusions

- Half of the MDT chambers in the inner and middle wheels may need to be upgraded for the ultimate LHC luminosity of $L = 2 - 3 \cdot 10^{34}$ cm^{-2}s^{-1}.
- A upgrade scenario for these regions must be worked out:
  - Which technology?
  - When?
  - Should we request a longer shutdown before the beam period with $L > 1 \cdot 10^{34}$ cm^{-2}s^{-1}?