Electron cloud MDs

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Outline

• Heat load MDs
• Tune shift MDs
• Incoherent MDs
• Instability MDs
Simulations predict non-monotonic behaviour of heat loads with bunch intensity that levels off or decreases with increasing bunch intensity → crucial for HL-LHC

Collect measurement data to confirm behaviour and to benchmark simulation models

Procedure for each intensity step:
1. Inject ~1200 bunches in trains of 48 bunches (450 GeV)
2. Wait for heat load transients to settle and measure heat load; Dump

Perform as many steps as possible, with intensity up to $1.8 \times 10^{11}$ p/b and ideally down to $0.4 \times 10^{11}$–$0.8 \times 10^{11}$ p/b

Time request: **8 h**, in **MD2** (Availability of high-intensity beams from injectors, SEY conditioning)

ADT experts and setup required.
Synergy with injection MDs,
collimation for halo population,
RF studies.

**Top priority** – important for HL-LHC readiness

Repeat measurements in 2023-25,
as higher bunch intensities up to $2.3 \times 10^{11}$ p/b become available
LHC: Validation of filling schemes for e-cloud mitigation
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• Based on e-cloud simulations, the heat loads for (the ramp-up towards) the HL-LHC are expected to be just barely within the available cooling capacity
• In case they turn out to be higher (e.g. further degradation of beam screens, models inaccurate), filling schemes mixing 25 ns and 8b+4e beams are foreseen as mitigation strategy
• Test schemes to confirm their feasibility in injectors and LHC, as well as their heat load reduction

Procedure:
1. Inject mixed trains (operational bunch intensity)
2. Wait for heat load transients to settle and measure heat load
3. Ramp to 6.8 TeV and measure heat load
Perform one or two fills, depending on MPP requirements

Time request: 8 h, in 2023

The scheme needs to be prepared in the injectors beforehand. Readiness of LHC injection systems to be verified in advance. **High priority** – important for HL-LHC

![Hybrid filling scheme (25 ns & 8b+4e, 2372 bunches)]