SPS scrubbing preparation

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Electron cloud meeting
04 March 2022
Outline

• Highlights from SPS MPC meeting on Wed 2.3 dedicated to scrubbing preparation
  https://indico.cern.ch/event/1133641/
  – Presentation on scrubbing preparation by Lotta
  – Presentation by Chiara on pressures and interlocks

• Discussion on scrubbing preparation
Scrubbing overview

Recover performance of LHC beam

• **Week 1: Scrubbing at flat bottom**
  – 4×72 bunches at end of long flat bottom
  – Condition the newly installed kicker MKDV1

• **Week 2: Scrubbing on the ramp**
  – 4×72 bunches at 450 GeV/c (not reached in 2021)
  – Continue conditioning the MKDH

MKP-L stress test

- When we reach the interlock temperature (60° C), expected towards end of Week 1
- Keep scrubbing beyond the interlock, while ABT monitors the kicker and injections

Crab cavities might go in COLDEX – not yet clear

Initial bunch intensity 1.3×10^{11} → gradually move to 1.5×10^{11} as the scrubbing allows

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Scrubbing overview

Prepare for LIU 2022 intensity goal

- **Weeks 3 and 4: Scrubbing at flat bottom with high intensity**
  - 4×72 bunches with 2×10^{11} p/b injected, at end of long flat bottom
  - Gradually increase the intensity from 1.5×10^{11} p/b, in steps of 0.1 – 0.2×10^{11} p/b
Equipment

Main equipment required during the scrubbing

- Direct e-cloud: e-cloud monitors

- Beam intensity: BCT, FBCT

- **Emittances: bunch-by-bunch wire scanners**
  - Not reliably operational in 2021
  - Some improvement since then, check with Alex working on it

- Instability monitoring: head tail monitor

- **Longitudinal tools: ABWLM**
  - What is the status of a possible stable phase measurement? Not available

- **Transverse feedback**
  - Might require dedicated setting up along the high intensity scrubbing
  - Gerd: Improved tools allow us change settings ourselves (instructions needed)

Crucial for monitoring beam quality to assess scrubbing progress
Highlights from vacuum team (Chiara)

• List of newly installed elements and corresponding gauges to monitor

• Pressure follow up of critical elements: kickers, TIDVG etc.
  – Don’t cross interlock pressure level, then wait for pressure to recover

• Logging in NXCALS is at 1Hz rate, as we requested last year
  – All the relevant gauges should be logged by default

• Interlock reading for MKDs modified so that erratic triggers shouldn’t happen this year

• Interlock levels for MKDs set to 3e-7 mbar (SW) (?)
  – Last year we had 1e-6 at flat bottom, do we need this again?
MKDV1 conditioning

In 2021 ~2 weeks required to condition MKDV1 below interlock threshold of 5e-8 mbar
• With relaxed interlock threshold of 5e-7 mbar in 2022 a week should be sufficient
SPS Scrubbing preparation

• Thanks to the SPS scrubbing run in 2021, we are fairly well prepared, but a few things remain to do before the scrubbing run

• Tools for data analysis:
  – Finish tools for treatment and analysis of e-cloud monitor data saved directly from the device (the PyJapcScout scripts fail too often for reliable data collection)
  – Check that NXCALS logging and download of required observables still works
  – Check status (with Hannes) of PyJapcScout scripts

• Storage space:
  – Make sure that we have space on spsscrub/spsecloud project space
  – Make sure that we have space on TN for saving PyJapcScout data
  – Set up folders for data saving

• Review remote connection procedure for PyJapcScout from home