Studies with carbon coatings in the SPS - MD run, week 25

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Overview of SPS MD runs

Overview of carbon coated liners inserted in SPS

Overview of carbon coated magnets inserted in SPS

Conclusions and Future plans
SPS scrubbing run

- Monday 15/6 (18:00) - Tuesday 16/6 (05:00) : 1-3 batches with 48 bunches
- Tuesday 16/6 (19:00) - Wednesday 17/6 (10:00): 2-3 batches with 72 bunches
- Thursday 17/6 (00:00) - Thursday 18/6 (08:30): 2-3 batches with 72 bunches, with acceleration

The nominal LHC cycle of 21.6 s.
Liners used for E-cloud monitoring

1. Stainless Steel (ref): SEMCLOUD1, channel 1-48, XSD1
2. a-C stripe (width: 40mm): SEMCLOUD1, channel 49-96, SDneg
3. a-C on Zr (rough surface): SEMCLOUD2, channel 1-48, EcEx
4. a-C (CNe13, been in SPS since last year): SEMCLOUD2, channel 49-96, XSD2

- All the tests were done in the magnets at a field of 1.2 kGauss.
- The beam energy in the scrubbing run was 450 GeV/c
Carbon Coatings

- a-C stripe/CNe32 - width 40 mm

Previous experiment (2008) in C-magnet with StSt reference sample
Carbon Coatings

- a-C/Zr: CNeZr run 10 Rough surface.
- a-C: CNe13, been in SPS since last year.
Results from FBCT

4 batches with acceleration

3 batches with 48 bunches
Pressure reading before the MD run (Background pressure). The pressure between the two coated magnet is twice higher than the one between the uncoated magnets.
P between the coated magnets is twice higher than P between the uncoated magnets.

Pressure rise after the injection of the beam:

\[ P - P(\text{background}) = \Delta p \]

\[ \Delta p\ (\text{uncoated}) = 2.59 \times 10^{-7} \text{mbar} \]

\[ \Delta p\ (\text{coated}) = 5.03 \times 10^{-7} \text{mbar} \]
Pressure reading - Maximum of the pressures

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Non-coated and coated had the same behaviour in pressure.
Conclusions

Scrubbing Run: StSt

- \( \delta_{\text{max}} = 2.25, \text{ higher than } \delta_{\text{threshold}} = 1.3 \)
- Normalized E-Cloud Current/FBCT started at -0.35, the same as from the previous run.
- After 3 nights scrubbing, E-Cloud has been reduced by nearly 30%.
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Scrubbing Run: a-C strip

- $\delta_{\text{max}} = 0.92$, lower than $\delta_{\text{threshold}} = 1.3$
- IT WORKS! BUT, the width of 40mm is a bit too low.
- It gives 350 times lower E-Cloud compared to StSt.
- After 3 nights scrubbing, E-Cloud has been reduced by nearly a factor of 2.
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Scrubbing Run: a-C on Zr

- $\delta_{max} = 0.96$, lower than $\delta_{threshold} = 1.3$
- It started at the same level as a-C strip.
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Scrubbing Run: a-C CNe13

- **Initial** $\delta_{max} = 1.0$
- Has been in the SPS since last year. It gives 4 times lower e-cloud from the start than the new carbon coatings.
- After 3 nights scrubbing, almost no E-Cloud effect can be detected.
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Pressure reading in the magnets

- Before the injection of the beam, the background pressure between the coated magnets was 2 times higher than the pressure between uncoated magnets. ⇒ Due to the higher outgassing in the carbon film and shorter pumping time.

- With acceleration, the pressure between the coated magnets became as high as the pressure between the uncoated magnets.

- The gauges for measuring the pressure between two coated magnets are close to a quadrupole. ⇐ High degassing in the quadrupole? Not really comparable with the gauge we took between the two uncoated magnets.
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Plans for the next MD

1. Read the pressure close to liners
2. Find a gauge between two uncoated magnets close to a quadrupole.
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Thanks a lot for your attention!

Questions???