

SPS BWS Issue Apr12th

Debrief of the CCC Meeting on April 13, 2023 (SPS BWS)

- **There is currently no clear evidence for why all 4 scanners stopped giving profiles.**
 - Motion profiles from the past weeks all look OK.
 - There is no evidence of scans above intensity thresholds.
 - **It is suspected that wire resistance** (from on-the-fly measurement) **systematically changed** for all scanners sometime last week (values are not recorded continuously but only when a scan is triggered).
 - Data retrieved by Jonathan from the logging DB.
 - **this would indicate wire breakage**
- What was different compared to the past: **a scrubbing cycle with high intensity and a long (5 sec) flat top, high rep rate**
 - Can this induce excessive heating/wire damage due to RF coupling?
 - Even in the parking positions?
 - Giovanni: We need to check past BWS impedance studies with last week's beam parameters.
- **Vacuum spike** observed close to Pt4 scanners (Hannes just put plot in the logbook).
- **William has already contacted VSC**; two scanners can be changed in a few hours stop (like the one foreseen next week) given the night is given to pump.
 - BI should be able to prepare two calibrated scanners by Tuesday.
- **Agreed plan:**
 - Keep looking into logged data.
 - Check the last scans of each scanner systematically.

- Search for possible failure causes (mechanics, electronics, FW, SW) that could have affected all scanners at the same time.
- if there is a short access: go to BA4 and/or BA5 to confirm wires are broken
- Contact ABP and RF for calculations (C. Vollinger is away for the next two weeks).
- Since it is not clear if scrubbing will stop next week, we agree to change only one scanner.
 - In point 4 (in pt5 there is a kicker being scrubbed in neighbouring sector, better not to open vacuum).
 - This scanner can be used at first to scan normal LHC beams and then see if scrubbing beam burns the wire (this 'destructive' test to be agreed).

@April 14, 2023

For the short-term decisions plan:

- By disconnecting the BWS cables in the surface racks BA4 and BA5, the measurement of the wires' resistance looks infinite, thus confirming the wire breakage.
- BI can prepare two calibrated systems by Tuesday evening, ready for installation on Wednesday, one at point 4 (V) and one at point 5 (H).
 - Opening points 4 and 5 will allow BI to recover 4 kinematic units that can be refurbished for new installation (assuming only the wires are broken) and can be prepared as future spares.
- VSC (Chiara) could do the exchange at both point 4 and 5 with
 - VSC manpower should be available but needs to be confirmed.
 - The intervention will require pumping all night between Wednesday and Thursday (no difference if one or both scanners are changed).
 - Opening point 5 would be
 - Transparent to the neighboring sector hosting kickers.

- At the moment of opening the valves for putting beam, there is a probability that the kicker (MKDV) sector (now at $1e-9$) experiences ($1-e7$) levels for xxx time.
 - This happened during the last intervention (does ABT have any opinion/input/history of this?).
 - The risk will be the same any time we do the intervention, e.g., TS1.
 - Chiara can give more details.
- After Wednesday, scrubbing may continue during nights, to be confirmed.

What is your opinion on changing one or two scanners?

I'll call for a quick zoom this afternoon if needed.

For the longer term:

- Two scrubbing beam variants (LHC 'standard' used most of the time or 8b4e used last week) could be at the origin of the coupling and wire heating, both accelerated and kept for 5 seconds at flat top, short bunches.
- Next week, ABP (Christine V. away) will try re-doing simulations on the BWS models with these beam variants.
- We should implement continuous wire resistance monitoring (not done only during a scan) possibly with logging only if anything abnormal is observed (e.g., via UCAP).
- In general, if the RF coupling problem is confirmed, simulations and lab measurements (like stretched wire) should be re-done to assess any need for upgrading the LIU scanners.