Week 23 (floating block)

Test of the collimator set up (R. Assmann, R. Bruce, D. Wollman, et al.)

In the beginning, several hours lost due to filling of the LHC.

Achieved:

1) Scan with different bump amplitudes: the TCSM was centered first with the BPM buttons and then with beam-based alignment using BLMs. This was repeated with orbit bumps of different amplitudes at the TCSM. The BPM and BLM-alignment results appear to have a good correlation. The orbit bump seemed to have only a small effect on the orbit at the collimator. The bump was moved in steps of 200 um from -1 to +1 mm. Larger steps of 1mm were tried in the end, but still the centre did not appear to change.
2) BPM linearity measurement (parallel movement of both jaws at constant collimator gaps): the gap sizes completed were: 28mm, 24mm, 20mm, 16mm, 12mm and 8mm. Not all movements could be done because of risk of scraping the beam too much.
3) Collimator angle BPM vs LVDT: Centres setup at 16mm gap. We scanned downstream in steps of (a) 100um and (b) 200um in both directions up to the maximum allowed tilt angle.
4) Influence of primary losses on BPM readings: beam fully scraped away in 40 um steps every 4 seconds (left jaw).
5) Influence of particle showers: could not be done due to time constraints.

Emittance growth measurements in coast (R. Calaga, E. Métral, R. Tomás, F. Zimmermann)

The planned MD basically did not take place as the beam was only available at 6:30pm due to several problems. After getting that beam we were unable to measure the tunes properly and the tunes we did measure were far from nominal. We could not determine whether this was measurement problem or something else.

We were told that they needed another access and therefore gave up our MD time for the collimation people to start on time after the access.

Therefore, for the next opportunity, we would like the same as requested before:

1. 1e10 p/bunch, single bunch
2. 270 GeV coast
3. Small emittance (~2 microns)

If possible, transverse damper setup for measurements with & w/o damper. We already spoke with W. Höfle and he will help setup the damper once we know the next MD data/time.

Weeks 24 to 26 (only parallel)

Emittance and loss measurements as a function of intensity with Q20 and Q26 optics and comparison between the two (H. Bartosik, Y. Papaphilippou, B. Salvant)

Last weeks of MD studies in SPS were dedicated to transverse emittance measurements as function of intensity for both the nominal and the low gamma transition optics. As the wire scanner measurements in the PS are now corrected, simultaneous measurements in both machines on the same individual bunch are possible. Comparative measurements of the emittances in the PS and SPS show that there is an intensity (brightness) dependent blow-up in the SPS for intensities above 1.5e11 ppb and injected emittances of about 1.2-1.5um which reaches in some cases up to 25% at 3e11 ppb in the low gammat optics. Similar observations are made for both optics, however significantly larger losses are observed in the nominal optics mainly related to TMCI at injection. In order to reduce these very fast losses (within the first 10ms after injection), high chromaticity in the vertical plane is needed (e.g. chromav~0.4 for 2.8e11 injected to reduce losses due to TMCI to below 5%).

Set up in the PSB of the single bunch single batch beam for the batch compression scheme in the PS (A. Findlay)

The starting point is the beam that was already set up to inject 8 PSB bunches into 8 of the 9 waiting buckets of the PS with h=9. Now all 4 rings have been set up to merge the 2 bunches into one bucket only at the time when normally the beam would be split. R3 & R4 have had the injection adjusted, and initial measurements have been made for R3, giving 135ns or 0.96 eVs and Eh & Ev ~3. The extraction timing is a tough part of this beam, and bunch # 2 of R3 and bunch #1 of R4 were attempted to be extracted, so that nothing need change for these 2 rings. A measurement problem was encountered with the Tomogram: the fact that we must select bunch #2 with the manual fixed point for the Tomogram to know it's performing an H2+1 Tomogram, is proving difficult when bunch #2 is empty! Optimisation of rings 1&2 will be done, R4 re-phased to avoid the above problem (unless a solution is found with Steve), then the extraction timing has to be sorted out to have the 4 consecutive bunches injected into the H=9 PS user. Fine tuning of the injection will be done to ensure the minimum transverse emittance for all rings.

Set up of the 100ns beam in the PSB and PS (A. Findlay, H. Damerau, S. Hancock)

In the PSB, the 100ns beam was set-up according the PS request, 3 rings H2+1, 2 bunches at extraction, 5E10 per bunch, 1 turn vertically shaved, 130ns or 0.9 eVs Eh & Ev ~0.25. This was later used by the PS and found to be acceptable for the required tests. 18 bunches with some 10-15% of nominal intensity per bunch have been produced at the PS extraction. There were some issues with the fine synchronization loop, but the beam would have been OK for tests with the SPS. However, the most important outstanding problem with the 100 ns beam is the generation scheme itself. The beam was intended for lead-proton collision tests in the LHC. The lead ion beam is a batch of four bunches spaced by 100 ns at extraction from the PS. The 100 ns proton beam can unfortunately only be produced as three or six bunch batches, due to triple splitting. There are some ideas to get four proton bunches out of PS, but it's not excluded that we have to start from scratch, using a different RF manipulation scheme.