**Questions and Remarks**

**Hannes Batosik:** Lattice Periodicity (S.03) and Emittance Growth (S.09) - I

**1)** During Hannes, talk he points out a significant emittance growth at transition observed at 18+ turns in the IPM data. Jeff E remarks that this coincided with very significant losses.

**2)** After Hannes’ talk, Jeff E remarks that Hannes’ estimated space-charge limited intensity is close to the PIP-II at 400 MeV targeted intensity. Hannes emphasizes that the error-bars on the exact are significant. It is also agreed that the loss-limited intensity occurs much earlier.

**3)** After Hannes’ talk, Tan remarks that the half-integer correction algorithm is the next step. Hannes mentions the link in Alex’s slides.

**4)** After Hannes’ talk, Sergei asks if the mechanism for the space-charge distortion of IPM data is known. The consensus is that it is known effect of the charge of the beam repelling the ions before they are collected. Alex and Vladimir S’s talks mentions methods to recalibrate the IPMs from a fit to data. Valery K states he is part of an active effort to simulate the IPMs to model the effects directly. Jeff E remarks that even a simple rescaling could make the IPMs more effective operationally, but that also the raw signal should be preserved for offline use of the IPMs.

**5)** Valeri L wonders why magnetic field is not used in our IPMs. It is agreed that it is because the IPMs are ion-based, rather than electron-based. Which leads to the question of why ion-based IPMs are used, and it is decided this is a question for instrumentation experts. There is a discussion of the performance record of Fermilab electron-based IPMs, which were used in the Tevatron and then the Recycler. No clear consensus on which style should be preferred or why.

**Alex Huschauer:** Lattice Periodicity (S.03) and Emittance Growth (S.09) -II

**6)** At the end of his talk, Alex mentions that the flat lattice may have inadvertently decrease symmetry of the periodic lattice since the half-resonance line seems to be if anything stronger. Tan states that it had not been his recollection of past version of the flat lattices which showed similar results. Jeff E mentions that TBT-data had been taken of the latest version flat lattice, although he hasn’t analyzed the data yet.

**7)** At the end of his talk, Alex suggests the IPM data-collecting could be improved by reconfiguring Labview to produce CSV (or directly readable) files rather than having to have a second step to convert to binary. Tan suggests the opposite, that a python script be made to handle the data in binary form. Jeff E mentions the IPM CSV files are much larger and that would be an advantage to working with binary. Alexey and Valeri L mention their success in working with binaries from oscilloscope data. Alex clarifies that the binaries are Labview formatted, it is agreed that it would be a workable solution if the formatting could be determined.

**8)** Alex mentions how the IPM intensity data sharply saturates at 5.56e12 protons, and that this could be improved. It is believed that this intensity data is not generated by the IPM itself, but instead grabbed from another source and so it might be a simple fix in the application.

**Vladimir Shiltsev:** Emittance Growth (S.09)

**9)** During Vladimir S’ talk, Tan remarks that he is impressed that tunescans can be conducted at as high-intensity as 14-turns. Kiyomi indicates that sparking the RF was not a significant problem. In this case the tunescan took place with one cycle every ten seconds, in a dedicated study period with no other Booster events.

**10)** During his talk, Vladimir S mentions that his experience at Tevatron and this Booster data indicates that the lower the chromaticity the better. He derives a rough quadratic scaling. Alex had also mentioned that lowering chromaticity had improved performance at CERN. Tan mentions that it is already part of the plan, to rely more on transverse dampers in order to lower the chromaticity and that this is something Jeff E is responsible for making happen. Alexey reflects that not all instabilities may be addressed with dampers. Jeff E agrees chromaticity should be lowered as dampers become operational. He mentions that the tune-spread limit is coming from the vertical plane and the vertical chromaticity is already quite low at -4.

**11)** Valeri L suggests losses would be instead be minimized at the natural chromaticity of the Booster, rather than zero chromaticity, because that would minimize the nonlinear effect of the sextupoles. He states that the natural chromaticity should be -6 and that at -4 for sextupoles are used more. Yuri mentions that the gradient dipoles also have a sextupole effect, so operation with the weakest sextupole effect is not necessarily the same as minimizing use of sextupole-correctors. It was agreed that the chromaticity without sextupole contributions and chromaticity without sextupole correctors could be checked in model and/or experiment.

**12)** During Vladimir’s talk, Kiyomi mentions that the tunescan caused very significant orbit deviations, up to 5 mm, that could be seen in the IPM data. She states that the tunescan effect on the orbit should be verified in the BPMs. Jeff states that significant orbit deviations as a result of the tunescan are quite plausible, given the significant down-feed effects.

**Michele Carla:**Nonlinear Chromaticity (S.07)

**13)** In Michele’s talk, he calculates the momentum offset from the orbit offset. Tan suggests that the momentum would be better calculated from the RF frequency. Jeff E remarks that we would need to calculate the momentum from RF frequency not “as programmed” but “as played” (because of the radial position feedback), but we were not able to find a good data acquisition for that.

**14)** During Michele’s talk, he shows work in which the momentum spread of the beam is estimated from the chromaticity and the spectral width of the betatron oscillation. Valeri L remarks that the impedance from the laminations should also have a decoherence effect. He also said that a reliable estimate of the beam momentum spread can be made from WCM data, and that the two methods should be compared. He said the impedance decoherence effect should be intensity-dependent, Jeff E said that the measurements were made at 4-turns and Valeri said that might be good enough.

**15)** During his talk Michele mentioned that the second-order chromaticity measurements in the horizontal and vertical plane were roughly comparable. Jeff E asked if there was any particular reason why it may be the case and ventured that it might be a combination of octupole-effects of quadrupole fringe fields and the fact that the betatron tunes are close. Michele said that we should not necessarily expect any relationship like that, and it must be modeled. Tan said that the second-order chromaticity Michele measured is not as strong as Tan remembered, although he would trust Michele’s seven-point measurement data over the three-point measurement.

**Nicolo Bianccaci:**Transverse Impedance (S.05)

**16)** Nicolo Bianccaci’s talk rescheduled to Wednesday. And it was decided we would begin half an hour early (at 8:30 CST) to accommodate the extra time.