Weekly Report for 08/03/2015

Highlights

• Presented "Physics considerations of SCU18-2 chamber design" at the SCU18-2 Beam Chamber Fabrication Readiness Review. (Kathy Harkay)

• Prepared poster on SCU1 for U Chicago Review, with Y. Ivanyushenkov. (Kathy Harkay)

APS Renewal and Upgrade

• Continued simulations of the booster at high charge. Found that the energy loss from the longitudinal impedance can significantly impact booster injection efficiency. In addition, the vertical aperture restriction associated with the bunch-cleaning stripline is important, while its impedance effect is relatively minor. (Ryan Lindberg)

• Discussed rf cavity HOM issues for the MBA ring with G. Waldschmidt and L. Emery. Reviewed prior lower-energy studies in the storage ring and HOM spectra measurements. (Kathy Harkay)

• Participated in PAR studies with C-Y Yao and J. Calvey. We observed a longitudindal instability at high charge (20-25 nC stored mode) that improved with higher rf voltage. Reviewed the literature on longitudinal mode-coupling instability (aka turbulent bunch lengthening), and the PAR observation was consistent. (Kathy Harkay)

• Contributed PAR/booster studies topics for the injector studies period. (Kathy Harkay)

• Reviewed the Injector R&D plan. (Kathy Harkay)

• Attended APS-U Physics meeting. (Kathy Harkay)

• Met with V. Sajaev to discuss my contribution to the 4-year plan. (Jeff Dooling)

• Attended the MBA Radiation and Accelerator Physics meetings. (Jeff Dooling)

• Also participated in the RSPPC meeting discussing a proposed change to the injector ACIS Beam Shut Off Current Monitors (BESOCMs) to support 1-Hz injector operation. (Jeff Dooling)

MCR Operations

Linac Operations

• With S. Shoaf discovered problem with EM2 digitizer that was causing the trigger window to shift from "post" to "pre" knocking out the uv energy signal. (Jeff Dooling)

• Checked uv polarization in the transport box, replaced the beam splitter for EM2, set up the SSA for IR pulsewidth measurements, and obtained upstream and downstream 2-D uv images for beam size. (Jeff Dooling)

• Analyzed SHG conversion efficiency given the temporal profiles measured from the SSA. Data shows a significant reduction in pulsewidth starting from a Gaussion IR profile. (Jeff Dooling)

• In order to accurately calculate conversion efficiency, must also account for the spatial narrowing of the pulse. (Jeff Dooling)

APS Machine Studies

Storage Ring Studies

• Participated in abort kicker (AK) studies with J. Dooling, who set up the BLM scopes, and V. Sajaev, who set up the BPM turn history measurement (8/4). We acquired BLM data for MPS only and MPS+AK at two kicker values, 8 kV and 10 kV. (Kathy Harkay)

• Conducted brief machine study with K. Harkay and V. Sajaev to evaluate the effectiveness of the abort kicker on losses in ID1 and ID6. (Jeff Dooling)

• Met later in the week with K. Harkay to discuss the study data; also will look at ID6 beam dump losses from earlier in the summer to compare with temperature transients. (Jeff Dooling)

APS Machine Research and Development

Storage Ring Research and Development

• Continued simulations of collective instabilities including feedback. The present results are encouraging, although at high chromaticity I find inexplicably small stable currents when the feedback is on. Need to discuss this with CY. (Ryan Lindberg)

• Provided input to V. Sajaev for AOP group 4-year development plan. (Kathy Harkay)

• Computed the abort-kicker loss distributions for MARS input for J. Dooling. This involves tracking the lost electrons for all 24 bunches back to the beginning of the Sector 39 straight. (Kathy Harkay)

• Processed the SCU0 ID6 BLM data for the 8/4 studies. We found that AK reduces the losses at ID6 and ID1 by an order of magnitude. (Kathy Harkay)

• Discussed radiation shielding calculations by H. Moe with Brad Micklich (ANL/PHY) that are relevant to abort kicker beam loss in S39 injection area. A beam loss of 100 mA should result in a radiation level of 0.01 mrem, which is orders of magnitude below the detection limit of 20 mrem for neutrons. On the basis of this conclusion, I requested approval to proceed with 100-mA beam dump tests with the abort kicker. (Kathy Harkay)

• Revisited ray tracing question for new SCU0 chamber design. Confirmed that the photon absorber passively shields BM radiation in the horizontal plane. Estimated image current heating at 130 mA in 24 bunches. Concluded that all physics requirements are satisfied. (Kathy Harkay)

• Calculated Run 2015-2 operational statistics for SCUs. SCU1 was operated for 1097.5 h and SCU0 for 1082.4 h, out of 1116.3 h total in User mode (through Jul 31). Found a discrepancy in User mode time: Fill History gives 1192 h for the same period. Determined that the 75.7-hr discrepancy occurs mostly from 6/10 to 6/16, but have not determined the cause. (Kathy Harkay)

Meetings, workshops, conferences, committees, LMS related, and reviews

• Served as the physicist member of the SCU18-2 Vacuum Chamber review commitee. Helped prepare review report. (Ryan Lindberg)

• Reviewed a paper for Optics Express. (Ryan Lindberg)

• Prepared poster on SCU1 for U Chicago Review, with Y. Ivanyushenkov. Updated ourt IPAC15 poster and added commissioning results with beam and operational statistics. (Kathy Harkay)

• Presented "Physics considerations of SCU18-2 chamber design" at the SCU18-2 Beam Chamber Fabrication Readiness Review. (Kathy Harkay)

• Participated in the Linac Structure Project Phase I Installation review (Stan Pasky)

• Written Aug/Sept Linac/PAR Alternate LOTO. (Stan Pasky)

• Written L2 conditioning guide for Aug/Sept maintenance period. (Stan Pasky)

• Attended Aug/Sept Maintenance Scheduling meetings. (Stan Pasky)

• Assisted operators with machine studies tunnel accesses and injector recovery. (Stan Pasky)

• rf conditioned 3G2 thermionic in preparation for user experiment of thermionic rf gun back bombardment studies. (Stan Pasky)

• Attended the Proposed Changes to BESOCMs and ACIS in Support of 1Hz Mode operation. (Stan Pasky)