Weekly Report for 08/17/2015

Highlights

• Carried out high-current studies in 48 uniformly-spaced bunches (150 mA) and 24 doublets (115 mA), uniformly spaced, doublets 4 buckets apart, for APS-U. (Kathy Harkay)

• Carried out abort-kicker studies with SCUs powered, with J. Dooling. Beam losses were higher than usual, possibly because of poorly-configured storage ring. SCU0 did not quench, but SCU1 quenched. More studies are planned. (Kathy Harkay)

• Prepared DOE CD1 Review Injector Requirements presentation. (Kathy Harkay)

APS Renewal and Upgrade

• Continued impedance simulations of injection/extraction kicker in collaboration with A. Blednykh. (Ryan Lindberg)

• Continued tracking simulations w/impedance of booster at lower injection energy. (Ryan Lindberg)

• Reviewed C-Y Yao's and R. Lindberg's presentations at last week's APS_U physics meeting, and C-Y Yao's and J. Calvey's presentations at the machine physics meeting. (Kathy Harkay)

• Developed a benefit-risk analysis for Injector upgrade R&D and reviewed it with C-Y Yao and G. Decker. Discussed Injector RF items briefly with A. Nassiri. (Kathy Harkay)

• Wrote a few paragraphs on PAR/Booster simulation for G. Decker, for the APS-U Accelerator R&D plan. (Kathy Harkay)

• Convened an Injector WG meeting. Prepared a draft presentation for DOE CD1 review on Injector Requirements and Plans and presented at the meeting. (Kathy Harkay)

• Finalized DOE CD1 presentation on Injector Requirements with G. Decker and posted on Prep area. (Kathy Harkay)

• Participated in PAR studies with C-Y Yao and J. Calvey. (Kathy Harkay)

MCR Operations

Linac Operations

• Made access into linac tunnel Tuesday and Wednesday to align the uv beam onto the photocathode. (Jeff Dooling)

• Aligned beam onto the EM3 energy monitor, the virtual cathode, and the alignment screen with the green alignment laser. (Jeff Dooling)

• Collected uv beam profiles between the first and second mirrors on the linac optics table. (Jeff Dooling)

APS Machine Studies

Storage Ring Studies

• Participated in an abort kicker study with K. Harkay early on Wednesday (8/19); the abort kicker was able to protect SCU0 but not SCU1. (Jeff Dooling)

• The behavior of the lost beam significantly differed from that observed on August 4. (Jeff Dooling)

• Carried out high-current studies in 48 uniformly-spaced bunches (150 mA) and 24 doublets (115 mA), uniformly spaced, doublets 4 buckets apart, for APS-U. No unusual transverse instabilities

noted, but 48 bunch pattern is more unstable longitudinally than 24 doublets. Instability was cured with an rf gap voltage of 8.8 MV (lower was unstable). Evidence that real HOM power is dissipated in the S38 HOM dampers in 48 bunches. More studies of these two bunch patterns are planned. (Kathy Harkay)

• Participated in abort kicker (AK) studies with J. Dooling, who set up the BLM scopes (8/19). We acquired BLM data for MPS only and MPS+AK at 8, 9, 10 kV. Powered both SCUs on. Good news: SCU0 did not quench. Bad news: SCU1 quenched. BLM data are puzzling; unusually high. Presented report at weekly machine studies meeting. (Kathy Harkay)

Linac Studies

• Participated in pc gun studies with Y. Sun Wednesday, Thursday, and Friday. Can generate more than 100 pC from the photocathode; however, having difficulty steering beam through L1AS1. (Jeff Dooling)

• Made an access into the tunnel Friday afternoon to verify the operation of the gate valves; these seem to be ok. (Jeff Dooling)

• Large steering corrections required to center the beam on PCG BPM 1 and 2. Scanned upstream corrector magnets using "quick Experiment." (Jeff Dooling)

• Took shifts in the Injector studies for PC gun operations in the APS linac. (Yin-e Sun)

• Performed RF phase scans of the PC gun, 100 pC bunch charge with 65 uJ UV power (this leads to a very low QE <1e-5, to be investigated, either the charge measured was too low or the UV was measured too high), set up the gun and front end beamline to propagate down to the LINAC. FIrst we observed PC gun beam on YAG1 and YAG2, as well as BPM1, BPM2 and BPM3 in the PC gun beam line. Beam was centered and focused. In order to find the proper arrival time at the first accelerating structure, the klystron that feeds PC gun RF (L3) llrf window start time, modulator trigger timing as well as PC gun drive laser pockel cell timing were adjusted. Diagnostics group provided help to compare beam arrival time on one of the channels on BPM1 and L1:AS1 RF window, it was confirmed that the PC Gun RF timing was set up properly. Upon proper focusing and steering, we were able to transport beam down to L1:AS1 and observe it on L1:P0, and linac screen after the thermionics RF guns (FS1). Upon proper phasing the L2 RF, we were able to observe beam on the BPMs downstream of L2:AS1 and L2:AS2. (Yin-e Sun)

• It was noted that the trajectory through L1:AS1 has narrow clearance with the existing (unipolar gun spectrometer power supply and only two sets of H/S steerers upstream of L1:AS1) steering magnets. Worked with PS group and linac chief operator, an additional set of steering magnet will be added upstream of L1:AS1, and the gun spectrometer supply will be changed to bipolar. (Yin-e Sun)

• We established a file for PC gun beam down to L2:P1. (Yin-e Sun)

• Worked with vacuum group to have the PC gun baked out during the shut down. (Yin-e Sun)

APS Machine Research and Development

Storage Ring Research and Development

• Began simulation investigation of 5 mm gap chamber to figure out what is the cause of the unexpectedly large impedance (Ryan Lindberg)

• Processed ID1, ID4, ID6 BLM data for the 8/19 studies. Found that integrated charge is sensitive to baseline substraction (confirmed by J. Dooling); each sector has a different noise level. (Kathy Harkay)

• Developed high-current plans for 48 bunches and 24 doublets (150 mA) for Aug 26. Verbal approval from A. Nassiri. (Kathy Harkay)

Linac Research and Development

• With pw of the compressed IR pulse increased, needed to reduce the spot size of the laser to maintain power density and good conversion efficiency through the doubling crystal set. Reduced the focal length of the second lens in the telescope between the regen and compressor by a factor of 2. (Jeff Dooling)

• Beam radius was reduced but not as much as expected. Still able to generate 80 micro-Joules of UV. (Jeff Dooling)

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

• Agreed to serve on search committee for TRIUMF ALD for Accelerators. Participated in the first teleconference and email committee activities. (Kathy Harkay)

Education, Mentoring and outreach

• Helped Lipi Gupta, K.-J. Kim's new graduate student, start simulations of the XFELO (Ryan Lindberg)

• Helped IIT student Medani Sangroula prepare a poster for IIT's grad student poster day. (Ryan Lindberg)

Safety and Required Training

• Completed HR301 EEO training. (Kathy Harkay)

• completed SEC101,EM116,EQO140,ESH120. (Yin-e Sun)