

Weekly Report for 03/09/2015

Highlights

- Carried out simulation studies with Cornell synrad3d of MBA Upgrade V6 multiplet chamber. (Kathy Harkay)
- Posted technical note, Analysis of an abort kicker for SCU quench protection, with multiple co-authors. (Kathy Harkay)

APS Renewal and Upgrade

- - Learned how to run ion instability simulation code by L. Wang. Ran the code for PAR parameters, with varying gas pressure and bunch charge. Confirmed that at low ion density, the simulation agrees with analytical estimates. Showed that ions will be trapped for the full PAR cycle, and so will eventually reach high density. Space charge will need to be included to get a realistic estimate of the ion effects, but it's currently disabled in the simulation. (Joe Calvey)
- - Working on developing an analytical model for the transverse monopole wake, which I believe can lead to emittance blowup under certain conditions. (Joe Calvey)
- Debugged problems with Cornell synrad3d code: reading an external photon reflectivity file (fixed the namelists); importing the synrad3d .dat_table output file into matlab (changed extension to .txt (recognizable to matlab) and got instructions from L. Boon). (Kathy Harkay)
- Carried out simulation studies with Cornell synrad3d of MBA Upgrade V6 multiplet chamber. Modeled a 11-mm round tube through 2-sector segment, and tracked photons from A:M1 for four cases: diffuse scattering Al₂O₃/Al, elastic scattering Al₂O₃/Al, no scattering, and diffuse scattering (C/Al, default). Post-processed and plotted azimuthal flux and power, and flux/m and power/m using L. Boon's matlab scripts. (Kathy Harkay)
- Briefly discussed ion simulation results with J. Calvey. Suggested that the observed positive tune slope may be smaller than the prediction from Lanfa Wang's code and Joe's analytical estimates, because it is partially cancelled by a negative classical wakefield-induced tune slope. (Kathy Harkay)
- Briefly discussed synchrotron radiation heating on ID chambers in the MBA upgrade with Mohan. Sent Mohan, G. Decker, and M. Borland synrad3d simulations results from Jan 2013 (with A. Vella and L. Boon), to start an email thread. (Kathy Harkay)
- Sent material on autocorrelation computation to B. Stillwell, for analysis of chamber roughness samples for MBA upgrade. (Kathy Harkay)

MCR Operations

Storage Ring Operations

- Assisted the MCR with turning beam over to Users. (Karen Schroeder)
- Investigated problem with fill pattern not being recognized when attempting to do a fill-on-fill/top-up. Found that the singlet in hybrid mode was filled manually and then the remaining bunches with the injection application. The singlet was not recorded as being filled when done this way. (Karen Schroeder)
- Investigated beam instability complaint from 31-ID that there was a brief instance when his beam moved (about 10 s) and then returned to original position. Found that this occurred during tune measurement and reported this to beamline. Reduction of P0 feedback back during tune measurement was increased. (Karen Schroeder)
- Spoke to Marty Smith regarding getting 19-ID's PV through the gateway. Requested them and their description from Gerd Rosenbaum to send to Marty. (Karen Schroeder)

- At Nick Sereno's request, raised the threshold for when 19-ID's X-ray BPMs would have non-zero gain, performed a gap scan during User Operations and added 19ID:P1 x-ray bps to orbit correction. (Karen Schroeder)
- Assisted the MCR with multiple beam motion/control law issues. (Karen Schroeder)
- Investigated beam losses. (Karen Schroeder)
- Documented the position of the BLMs inside SCU1, with C. Doose's assistance. (Kathy Harkay)

Linac Operations

- Assisted with troubleshooting and repair of the RG2 kicker which resulted a tunnel access to restore a loose connection on a charging resistor. Injector downtime #106308 - 00:20 to 06:31 - RG2 kicker issues - Inhibits beam to machine study. (Stan Pasky)
- Held a meeting to discuss the state of the thermionic guns; summarized recent work trying to understand why high cathode heater power is required for RG1. (Jeff Dooling)
- At the meeting, the consensus was to immediately move 3G3 from the vacuum lab to the ITS for power testing. We were unable to generate any current from this gun while installed in RG1. (Jeff Dooling)
- Requested a laser chiller interlock system be implemented to monitor turbidity, flow rate, and water level. (Jeff Dooling)

MCR Operations administrative/misc.

- Produced downtime report for OPS Directorate and either presented it myself or gave to Flood for presentation. (Karen Schroeder)

APS Machine Studies

Storage Ring Studies

- Performed gap scans to update gap feedforward tables and returned BPMs back to orbit control which had been removed because of steering. (Karen Schroeder)
- Provided information to Tom Fors regarding what was/was not operational at the time of his dipole spectrum measurement. (Karen Schroeder)
- Moved 26-ID away from BPLD limits with Users permission. (Karen Schroeder)
- Tested FPGA acquisition script, injection trigger, for use in beam loss studies, with H. Shang, N. Sereno, and J. Dooling. It was initially (almost) working, but then there was a problem and we so postponed our beam studies for next week. (Kathy Harkay)

Booster Studies

- - Helped with CY Yao's measurement of tune vs charge in the booster. Wrote the notebook file. (Joe Calvey)

Linac Studies

- Conducted a tune up study of RG2 gun (3G2) with Y. Sun. (Jeff Dooling)
- Looked at gun cathode resistance values for both RG1 and RG2 by plotting voltage vs. current. RG1 resistance is higher than RG2; 4.8 ohms vs. 3.0 ohms. (Jeff Dooling)

ITS Studies

- Perform rf conditioning and beam operations on thermionic rf gun 3G3. Detailed graphs, charts and gun performance information can be found in Accelerator Machine Studies LogBook (Elog) ID# 178 and 179. (Stan Pasky)

APS Machine Research and Development

Storage Ring Research and Development

- Met with K. Harkay to review recent loss distributions generated by elegant to analyze using MARS for the thin septum. (Jeff Dooling)
- Put together a talk on "Abort kicker multiparticle tracking, Part 2" for the weekly AOP physics meeting. Meeting was canceled. (Kathy Harkay)
- Discussed beam loss distributions at the septum calculated in elegant with J. Dooling, for input into MARS. Debugged an issue Jeff had with reading the files. Discussed a preliminary MARS simulation he carried out for bunch 10 (case abort25: 1-mrad peak kick, waveform L3). (Kathy Harkay)
- Discussed placement of thermal sensors 1,7 on SCU1 chamber with C. Doose and Q. Hasse. In the first SCU1 chamber, they were mounted in tapped holes on the bimetallic flange. In the second SCU1 chamber, since the bimetallic flange failed, no holes were drilled. Sensors 1,7 are instead mounted on the Al chamber, close to the Al weld (which is vertically misaligned on the DS end, at sensor 7). (Kathy Harkay)

Linac Research and Development

- Presented PC Gun Drive Laser status at the March 11 Photo-injector Physics meeting; laser energy is dropping. (Jeff Dooling)
- Requested from Diagnostics Group a permanent tap from an upstream linac bpm to record unfiltered time signals. (Jeff Dooling)
- These signals represent rf thermionic gun output current and allow a check of beam alignment through the gun kickers as well as an accurate temporal measure of the macropulse. (Jeff Dooling)

APS Machine Software

AOP Applications Software

- Found a bug in sddshist for multiple pages, and reported it to M. Borland, who fixed it. (Kathy Harkay)

Storage Ring

- corrected the filter file names for SROrbitSetPt-FilterFiles.sdds (SROrbitSetPt SCR) and made the partial comparison work for SROrbitSetPt. (Hairong Shang)
- updated IDdevices.sdds to increase the gap threshold ofr ID19 (changed from 25 to 30mm). (Hairong Shang)

Injectors

- did RG2 gun conditioning machine study with Yine. fixed bugs in measurement script, and improved the penalty computation(with better design) to properly fit the desired results. (Hairong Shang)
- changed IRamp start/stop correction limit to make the correction more stable. (Hairong Shang)

- added lattice arguments to BBPMHistWaveformSetup so that user can setup parameters desired lattice as needed. (Hairong Shang)
- improved Booster lattice switch pem: instead of hard-coding the fft parameters, now use BBPMHistWaveformSetup script to setup the booster BPM fft parameters. (Hairong Shang)

General

- implemented sddfresnel for computing one-dimensional Fresnel diffraction patterns of a general mask design for point and Gaussian sources. ready for review and testing. (Hairong Shang)
- made it optional for run statistics with test in ExperimentDesigner per CY's request. (Hairong Shang)

Simulation Software

- - Learning how to run GdfidL. Created a model for the small aperture undulator chamber used in CESR, and verified that the calculated wakes agree with the code used at Cornell (T3P). (Joe Calvey)

Publications, papers and report

- For SCU0 paper, addressed final comments by A. Zolents and M. Borland and reviewed our response to editor/referees with Y. Ivanyushenkov, and replotted one Excel Figure. Yury resubmitted the paper. Generated a 2-column format in latex to get an idea of how it will look published. (Kathy Harkay)
- Completed and posted technical note: Analysis of an abort kicker for SCU quench protection, with J. Dooling, R. Laird, F. Lenkszus, R. Putnam, V. Sajaev, J. Wang, J. Zientek (R. Putnam added in Rev 1). (Kathy Harkay)

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

- Attended meeting for improving orbit control for beamlines (Karen Schroeder)
- Attended shutdown planning meeting (Karen Schroeder)
- Reviewed LCLS-II Director's Review for CD-3b report and submitted minor corrections. (Kathy Harkay)
- Accepted invitation to chair an contributed oral session at IPAC 2015 (Richmond, VA). (Kathy Harkay)

Education, Mentoring and outreach

- Submitted nomination of L. Boon for the APS Division of Physics of Beams DPB Outstanding Thesis Award. Solicited recommendation letters from J. Crittenden (Cornell) and Purdue Prof. S. Durbin. (Kathy Harkay)

Safety and Required Training

- Every two years all qualified operators are required to pass a requalification exam for the Injectors. As Booster CO, I've produced the requal exam (Requalification = http://www.aps4.anl.gov/operations/ops_www/OPSqualificationProcedures/BOOSTER/Requalification_Exam_2014.pdf) and sent notice to all Operators to please complete before the end of the second week of April. (Stan Pasky)

- Provide Klystron Gallery training to new operator - E. Smith. This training covers finding major Switch Gear and Breaker Panels as well as find key operating components of the linac injector. Upon testing the operator should describe, identify and/or perform the requested task outlined in the Walkthrough Test.
(http://www.aps4.anl.gov/operations/ops_www/OPSqualificationProcedures/LINAC/LinacWalk_Rev8_Walkthrough%20_Oral.pdf) (Stan Pasky)
- Reviewed Job Hazard Questionnaire, made changes and submitted for approval (Karen Schroeder)
- Completed HR498, SEC101. (Kathy Harkay)