

Weekly Report for 02/23/2015

Highlights

- Gave an invited colloquium at IIT entitled: Superconducting undulators at the Advanced Photon Source: high brightness x-rays for today and the future. (Kathy Harkay)
- Organized and conducted training for Cornell code synrad3d to be used to model MBA vacuum, hosting expert L. Boon (Kathy Harkay)

APS Renewal and Upgrade

- Organized and conducted training for synrad3d, the Cornell 3D synchrotron photon tracking code. Hosted expert, Laura Boon, who presented background and how to set up a simulation. She also gave us several matlab post-processing scripts. We practiced simulating the absorbed radiation power downstream of the MBA multiplet A section. We also constructed a photon reflectivity table for an 11-nm Al₂O₃ layer on Al. Participating were B. Stillwell, J. Carter, K. Suthar, and J. Calvey. (Kathy Harkay)
- Discussed ion effects in the PAR with CY Yao and J. Calvey. (Kathy Harkay)
- Continue work on Touschek simulation and round beam simulation. Read CDR report. (Aimin Xiao)
- Obtained GdfidL model of the kicker from Xiang Sun. Began modifying so that myself and/or Alexei can compare it's wakefield to the model I already have. (Ryan Lindberg)
- MOGA optimization on V6 lattice with reverse bends. (Yipeng Sun)
- MOGA optimization on alternate lattice with reverse bends. (Yipeng Sun)
- Evaluations of MOGA solutions. (Yipeng Sun)

MCR Operations

Storage Ring Operations

- Assisted the MCR with turning beam over to the Users. (Karen Schroeder)
- Assisted the MCR with multiple orbit/beam motion issues. (Karen Schroeder)
- Investigated beam losses. Passed on information to P.S. group about a possible glitching vertical corrector and set up a PV monitor with instructions to operators on how to check if there is a similar beam loss. (Karen Schroeder)
- Investigated beam stability complaints from sector 19 (both ID & BM) and met with Users. Could find no reason for the beam instability the BM beamline was seeing and reported the small drift we were seeing back to the ID beamline. Passed the information on to Emery for further investigation. (Karen Schroeder)

Linac Operations

- Drafted a memo for ASD and AES Divisional approval to allow ACIS modifications permitting Class II laser light from the laser room into the linac tunnel while the tunnel is in Authorized Access. Memo was based on the recommendation of the RSPPC. (Jeff Dooling)
- Last Tuesday evening / Wednesday morning I was able to RF condition the third generation RF gun in RG1 position to ~ 4MW using a 1 μ s pulse width as well as generate ~ 300ma from the gun for a short period. However - the RG1 heater power supply was displaying some drop out that will be addressed before my next machine studies for RG1. (Stan Pasky)
- Reports of phase drift with L4 have been reported by the operators. This has resulted with disabling

Beam Phase Control-Law as this phase drift as rendered LTP control-law multiple times. Discussing this issue with RF engineering together we will be monitoring L4 preamp and new 500MW amplifier for possible drift. (Stan Pasky)

- 2/24/2015 worked on RG2 beam tuning through linac with Jeff Dooling. Goals are at the recommended RG2 kicker thyatron heater reservoir voltage and with linac quads (L2 and downstream) at designed lattice settings, obtain sufficient charge at LTP. (Yin-e Sun)
- used generic optimizer, first optimized steering in the RG2 area to maximum bunch charge downstream of alpha-magnet. Then added kicker voltage, alpha magnet as variables. Finally added quads into the optimization to maximize bunch charge. Unfortunately beam is not well focused on FS1 at this settings, further optimization through the linac to get good transportation to LTP was not successful with the variables mentioned above. (Yin-e Sun)
- 3/3/2015 worked on RG2 beam tuning through linac with Michael Borland and Jeff Dooling. Starting with a new linac lattice file that Michael has generated. The guide line is to run RG2 at intended energy (~ 3MeV total energy), experimentally confirmed by scraper measurement that Michael conducted. However bunch charge downstream of the alpha-magnet was below 0.4 nC and beam profile does not agree very well with simulations. Generic optimizer was able bring up the bunch charge to 0.9 nC but we run out of machines study time before we can try beam matching in the linac using generic optimizer. (Yin-e Sun)
- During linac access of machine study, went inside linac to observe the RG1 and RG2 heater glow when both are set at 15 W. observed a bright glow for RG2 while very dim for RG1. Indicating RG1 cathode is not getting very hot. Took pictures. (Yin-e Sun)
- Discussed with Rob Wright on possible ways to fix the flow issue of gun-II gun MG300. (Yin-e Sun)

MCR Operations administrative/misc.

- Produced the downtime report for OPS Directorate and either presented or gave to Flood to present. (Karen Schroeder)
- Reviewed and approved non-RSS storage ring work requests. (Karen Schroeder)

APS Machine Studies

Storage Ring Studies

- Repeated fast BLM calibration study in ID1 with K. Harkay, this time using a horizontal orbit bump to increase the loss charge seen by the monitor. (Jeff Dooling)
- Though loss with the bump was higher than loss without, the integrated signals are still significantly less than those measured in the Fall at both US and DS locations. (Jeff Dooling)
- Performed ID gap scans to update gap feedforward tables. (Karen Schroeder)
- ID4 physical aperture. (Yipeng Sun)
- Fractional tune scan. (Yipeng Sun)

PAR Studies

- Participated in PAR studies with CY. Yao and J. Calvey. We measured the tune slope and beam size variation with charge up to about 4 nC. Wrote the Notebook file. (Kathy Harkay)

Linac Studies

- Conducted RG2 tune-up study with Yine Sun. (Jeff Dooling)
- Made entry into the linac tunnel with Yine Sun to work on alignment of drive laser onto the cathode of the pc gun. (Jeff Dooling)
- Provided W. Berg with photographs of the RG2 Faraday cup and chromox flag optics. (Jeff Dooling)

APS Machine Research and Development

Storage Ring Research and Development

- Evaluated repaired SCU1 chamber with respect to effect of decreased vertical aperture at the SS weld. Reviewed calculations of synchrotron radiation heating assuming a "step", presented at SCU1 IRR (Dec 2014), and updated calculations based on measurements. Discussed with V. Sajaev. Also speculated on injection beam losses and potential increased quench risk for SCU1. (Kathy Harkay)
- Took photos inside aperture of complete SCU1 chamber, in particular the small cutout in the SS. Noted that on one end the cutout is smooth and on the other, it is rough. On the rough end, the Al weld is not aligned vertically, and further decreases the aperture. I preferred that this end be installed downstream from the beam loss point of view, but the magnet measurement setup preferred that the smaller end be installed upstream in the cryostat. (Kathy Harkay)
- Discussed beam loss distributions at the septum calculated in elegant with J. Dooling, for input into MARS. (Kathy Harkay)
- Continue to work on SR thin-septum model in MARS. (Jeff Dooling)

Booster Research and Development

- Built GdfidL models of most of the impedance elements in the booster based on drawings. Began running simulations to determine wakefields. (Ryan Lindberg)

Linac Research and Development

- Investigating reduction of IR energy from pc gun drive laser. (Jeff Dooling)
- Collected pump diode current and light emission data as well as spectra from both upstream and downstream heads. Pump current levels are similar to those measured in 2013. (Jeff Dooling)
- Also collected spectra of the regen amplifier output. (Jeff Dooling)
- Talked with W. Berg about setting up an experiment to measure the absorption line of the Nd:Glass laser rods. (Jeff Dooling)
- attend meeting for the new RF gun design for APS operations hosted by RF group. Suggested to start with the physics design from X. Sun's work and adding thermal/mechanical components to it. (Yin-e Sun)
- looked into simulations of the thermionic rf gun using ASTRA. (Yin-e Sun)

ITS Research and Development

- had a meeting with Euclid to talk about their proposal on a THz radiation experiment at ITS. Wrote meeting minute and send it to meeting attendees and division director for consideration. (Yin-e Sun)
- Worked with Bill Jansma and extracted ITS beamline elements locations as-installed for the RadiaBeam experiment, made a layout sketch with dimensions and provided it to Euclid. (Yin-e Sun)

APS Machine Software

Storage Ring

- wrote script for compute the RTFB high pass filter ramp values for 4x4 matrix RTFB feedback test. And tested 4x4 RTFB matrix with Shifu. It seemed that it worked because S27/S28 bpps showed smaller orbit than other places, however, did not see much correction. further tests are needed. (Hairong Shang)
- continue working SRUnifiedSteeringConfig. (Hairong Shang)

Injectors

- modified GetBooRampCurrWF to use It:Bs:LastBunch2BoosterIp (booster IP) and It:Ddg4chan5CC (booster start digitizer) to compute the injection time. (Hairong Shang)
- fixed bugs in CY's setLinacBuckets script. (Hairong Shang)

General

- fixed the script errors for Yipeng Sun's measure lifetime scripts. (Hairong Shang)
- prepared ICALEPCS 2015 abstract on SR unified feedback software, submitted. (Hairong Shang)

Publications, papers and report

- Continued to update figures and text in response to referee and M. Borland's comments on SCUO paper. (Kathy Harkay)

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

- Gave an invited colloquium at IIT entitled: Superconducting undulators at the Advanced Photon Source: high brightness x-rays for today and the future. The colloquium was very well received. Followed up with a student who was interested in jobs at Argonne. (Kathy Harkay)
- Contributed to the report from the Accelerator Systems subcommittee for the Director's Review for LCLS-II CD-3b at SLAC. (Kathy Harkay)
- Reviewed article for PRST-AB. (Ryan Lindberg)
- Reviewed one paper for PRST-AB. (Yipeng Sun)
- attended group meetings. (Yin-e Sun)

LCLS

- Discussed simulations of XFEL in GINGER - operating an XFEL at a harmonic of the fundamental might be a possible route for "LCLS-II+" (Ryan Lindberg)

Safety and Required Training

- Took multiple required safety classes on-line (Karen Schroeder)
- Completed - SEC101: Counterintelligence, Classification, Export Control and Security Refresher (Stan Pasky)

Miscellaneous

- Make study schedules for the 48 h period. (Aimin Xiao)

- Took one day vacation off (Aimin Xiao)