

Weekly Report for 07/27/2015

APS Renewal and Upgrade

- MOGA optimization of alternate upgrade lattices with reverse bends. (Yipeng Sun)
- Attended the Injector Working Group Meeting Monday. (Jeff Dooling)
- With SLAC ion simulation code, studied the possibility of chirping to reduce ion density. Also ran simulations with higher beam energy to study its effect on beam stability. (Joe Calvey)
- Compiled, ran, and analyzed sample output from CERN FASTION code. Working on making input files for the PAR. (Joe Calvey)
- Provided R. Lindberg with measured PAR beam parameters vs charge, for use in booster injection simulations. (Joe Calvey)

MCR Operations

Storage Ring Operations

- Assisted MCR with turning beam over to Users (Karen Schroeder)
- Assisted the MCR with diagnosing and removal of boms from orbit control (Karen Schroeder)
- Assisted the MCR with recovery from partial beam loss (Karen Schroeder)
- Investigated loss in flux of 24-IDs reported to the F.C. by the Users. Found no changes in BPMs/correctors at or near the time frame the Users indicated. (Karen Schroeder)

Linac Operations

- discussed with linac chief operator and power supply group leader on installed conduit for RG2 kicker cables. (Yin-e Sun)
- Met with A. DiChiara regarding laser doubling efficiency. He said to check beam divergence and spot size. (Jeff Dooling)
- Comparing recent compressor image data with that from 2013, spot sizes are essentially the same, only spot intensity has changed. (Jeff Dooling)
- DiChiara was able to spend an hour with me in the Laser Room Tuesday. Obtained UV energy of 50 microJoules with a pump current of 178 A. (Jeff Dooling)
- Communicated with Northrup Grumman Cutting Edge Optronics (NGCEO) engineer K. Callan about difference between Iset and Isense reported from the eDrive. Above Iset=185 A, Isense begins to drop. (Jeff Dooling)
- Wednesday, reduced the pulse width of the eDrive pump to 250 microseconds and observed that the problem went away. (Jeff Dooling)
- NGCEO conclusion: eDrive capacitor running out of charge for highest demand current; we can either fix this ourselves or send the unit in for repair. (Jeff Dooling)
- Thursday, increased laser uv energy output from 50 to 130 microJoules through alignment and raising pump current. (Jeff Dooling)
- Using a spectrometer, measured the pump light from the DS head looking for any IR radiation; saw none. (Jeff Dooling)
- Friday, found a uv mirror in the transport box that was creating double uv spots; replaced it with

another uv optic which yielded a single spot. (Jeff Dooling)

- Energy in the uv more than doubled from 130 microJoules to 280 microJoules (the calibrated detector indicated 230 microJoules). (Jeff Dooling)
- Verified uv with spectrometer using fused silica fiber-optic cable. (Jeff Dooling)
- Monday, took samples of laser chiller coolant with high turbidity to the Analytical Chemistry Lab for testing, contact D. Graczyk (NE, 3489). On Friday, received pH levels for samples; inorganic results will take longer. (Jeff Dooling)

ITS Operations

- Worked with collaborator from Fermilab in an experiment of measuring the thermionic RF gun emitted current as the rf power into the gun, rf rep rate, and cathode heater power are varied. Took several sets of data, however experimental results appear to be against initial theoretical prediction (as higher rep rate, the average macro pulse current dropped instead of increasing). Investigated the rf power into the gun and the LLRF measurement, verified the displayed measured power is indeed the peak value on the rf waveform and not averaged in the rf pulse window. More time needed for pondering... (Yin-e Sun)

MCR Operations administrative/misc.

- Compiled downtime report and presented to OPS Directorate. (Karen Schroeder)
- Updated 15-3 run with RHB changes and produced 16-1 run of the Long Range Schedule and gave to OPS Directorate for approval (Karen Schroeder)
- Reviewed and approved non-RSS SR work requests (Karen Schroeder)
- Reviewed and approved Swap-out of SR Converters procedure (Karen Schroeder)
- Reviewed the new procedures and sent out the SR and Floor Coordinator procedures which pertained to the MCR for required reading. (Karen Schroeder)

APS Machine Studies

Storage Ring Studies

- Analysed lifetime data. (Yipeng Sun)
- Performed gap scans and updated ID gap feedforward tables. Worked with Hairong to get changes made to several PEMs using SCU1 to make function quicker. (Karen Schroeder)
- Produced both the beam and non-beam portion of the machine studies schedule and updated as needed. (Karen Schroeder)

PAR Studies

- With C. Yao and K. Harkay, achieved ~10nC in PAR in 2 Hz mode, and ~25 nC in stored mode. Measured beam properties in both modes. (Joe Calvey)
- Measured PAR tune shift/spread vs charge with new gated drive system. (Joe Calvey)

APS Machine Research and Development

Linac Research and Development

- Worked on the optics of the transverse-mode cavity to be installed in the Linac for longitudinal phase space measurements and slice transverse emittance measurements. Worked on particle tracking use elegant to compare initial longitudinal phase space and beam x-y image on the regular flag (LTP:FL1). Optimized the lattice from Tcav to LTP1 to get good resolution on the energy and bunch time profile measurements using a reasonable tcav voltage. (Yin-e Sun)
- Discussed with control groups, and power supply group colleagues about possible issues for linac interleaving operations. (Yin-e Sun)
- worked on the parameter needed and discussed with RF group on the initial RF conditioning goal of the Tcav at the klystron gallery, and goal for RF conditioning after Tcav is installed in the linac. (Yin-e Sun)

Other Research and Development

- Continued GPT simulations of double emittance exchanger for a 10MeV electron beam; worked out beam matrix transformation through the beam line transfer matrix for the emittance exchanger in order to understand why an initial longitudinal chirp is necessary to keep beam transverse size under control at the tcav location in the 2nd emittance exchanger. (Yin-e Sun)

APS Machine Software

Storage Ring

- Improved gap scan and gap moving script for ID01 so that it opens the ID01us before turning SCU1 on thus avoid trip off SCU1, and turns SCU1 off before closing ID01ds gap. Tested and installed gap scan and moving scripts such as APSMpID.tcl, APSMpSRGapFFScan.tcl, APSSRGapBriefScan.tcl, and APSSRGapFullScan.tcl (Hairong Shang)
- tested and installed APSMpRTFBReboot.tcl for restoring SRXrayBPM and SRXrayBPMWaveform system in APSMpRTFBReboot pem. (Hairong Shang)
- fixed a problem of MpBPMWaveformViewer when running dnsdomainname command on some linux machines like ratbert, which returns "Unknow host" instead of "none", which caused the application crashes; also fixed a problem that the application crashes when the turn marker interval stored in IOC is not in the turn marker list. (Hairong Shang)
- Improved P0FeedbackControl to work for 48 bunches, and added "Get P0FB tune" button to measure and plot P0FB tune. (Hairong Shang)
- To save the gap close/open time in switch orbit pem, added changing the xbpm reference gap and SetGapTo60mm links to user gaps (for example, link to ID01ds if it is being used in user operation) when switching to machine physics mode, so that the closing gap of ID01 in xbpm reference and user operation gaps are the same. (Hairong Shang)
- setup FPGA bpm timing control for 48-bunches, wrote an Elog on how to setup timing control for a new bunch pattern. (Hairong Shang)

Injectors

- commented out reset AFG trigger for APSMpBoosterPSSetFullPower pem since the reset AFG trigger does not work for IRamp mode. (Hairong Shang)
- updated the turn on/off booster tune drive of BoosterTuneFPGA due to the hardware changes. (Hairong Shang)
- wrote boosterVSAControl GUI for controlling booster VSA scope instead of posting the X-window GUI for control, which often freezes the scope and one has to boot it locally. (Hairong Shang)

General

- added delta and ramp option to cavputwaveform. (Hairong Shang)
- wrote sdds2dffft for 2-dimensional fft, tested with a 4x4 matrices, it agree with matlab. working on a matlab script to testing sdds2dffft. (Hairong Shang)

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

- Reviewed a paper for PRST-AB. (Yipeng Sun)
- hosted photo-injector physics meeting. (Yin-e Sun)
- worked on a talk and presented Tcav optics particle tracking in the Tcav diagnostics meeting. (Yin-e Sun)
- attended linac structure straightening meeting. (Yin-e Sun)
- Attend a meeting for the new thermionic rf gun design requirement and give input to the related document. (Yin-e Sun)
- Participated in RSPPC Committee reviewing the changes to the BESOCM to monitor for high charge (Karen Schroeder)
- Attended shutdown planning meetings and provided information as needed. (Karen Schroeder)

Safety and Required Training

- Completed ESH108-400 training. (Jeff Dooling)