March 31, 2022 REPORT | MAR 14 – APR 8
DIRECTOR: TODD SATOGATA

Todd Satogata

Previous two weeks (Mar 14 – Mar 25)

- EIC Meetings (management, RF, crab, cooling, impedance, team, R&D, beam-beam)
- EIC BNL Meetings (Ferdinand and L2s, Design/R&D leadership)
- EIC TCCB (Mar 22), HSR coordination (Mar 21), ERL scope (Mar 21)
- EIC Commissioning L2 transition planning (with Wolfram Fischer)
- EIC Start evaluating crab multipole time-domain simulations
- MGMT Meetings (Leadership/Dept Heads, CASA coffee, Andrei triweekly)
- MGMT CASA move planning, document control
- MGMT S&T Risk Matrix training (Mar 23)
- ADMIN Reach out to SuperKEKB beam physics task force
- SERVICE Finalize snowmass education/outreach white paper
- SERVICE JMU Madison Accelerator Lab program advisory committee (Mar 24)
- VACATION Mar 18

Next two weeks (Mar 28 – Apr 8)

- EIC Meetings (management, RF, crab cooling, impedance team, R&D, beam-beam)
- EIC BNL Meetings (Ferdinand and L2s, Design/R&D leadership)
- EIC IR/MDI review (Apr 6-7), dry runs (Mar 30-31)
- EIC Continue evaluating crab multipole time-domain simulations
- MGMT Meetings (Leadership/Dept Heads, CASA coffee, Andrei triweekly, P&C)
- ODU Josh Yoskowitz PhD Defense (Apr 1), Sunil Pokharel annual review (Apr 4)
- SERVICE DOE ECA Super Panel (Apr 4-6), APS DPB EOD (Apr 8)
- MED LEAVE (Apr 5 AM

Alex Bogacz

Previous two weeks (Mar 14 – Mar 25)

- FFA@CEBAF collaborative work
- Preparing a joint FOA with BNL and Cornell
- Preparing a talk on CEBAF energy upgrade for J-FUTURE workshop
- NuFact'22 SPC work

Next two weeks (Mar 28 – Apr 8)

- Mentoring Isurumali on arc optics design
- FFA@CEBAF collaborative work
- Finalizing a joint FOA with BNL and Cornell
- Presenting a talk on CEBAF energy upgrade for J-FUTURE workshop
- Write up on the LHeC ERL and PERLE for 'Future of LHC' publication

Ryan Bodenstein

Previous two weeks (Mar 14 – Mar 25)

- Various OPS related meetings
- FFA@CEBAF collab work
    - Translation to BMAD: testing code from David Saga
        - Almost done with ARCs, then will try linacs
    - Working on re-designing the spreaders for the 650 MeV injector
- Positron/FFA liaison work

- Student Guidance
    - Isurumali – guidance for arc optics, edits to paper, will write recommendation letter
    - Alex C – Getting lab laptop, general guidance and mentorship
- LDRD work
    - Met with Latifa for approval of student laptop and possible student travel to FFA22

Next two weeks (Mar 28 – Apr 8)

- Various OPS related meetings
- FFA@CEBAF collab work
    - First spreader done unrealistically strong dipoles. Looking into new layouts
- Positron/FFA liaison work
- Student Guidance
    - Isurumali – guidance for arc optics, edits to papers, will wrote recommendation letter
    - Alex C – Getting lab laptop, general guidance and mentorship
- LDRD work
    - Checking who we can use for replacement staffing until we get a postdoc
    - Preparing for Q2 report

Rui Li

Previous two weeks (Mar 14 – Mar 25)

- Served in the interview panel for the SRF dept. for their SSI hiring
- Made progress in unscrambling the coupling of bunch timing and coupled-bunch modes in the output data from the TCBI simulation
- Theoretical analysis of the eigenmodes for the TCBI simulation

Next two weeks (Mar 28 – Apr 8)

- For the TCBI simulation, refining post-processing tools for my simulation modeling and examining the characteristics (growth rate and coherent tune shift) for each coupled-bunch mode
- Zoom discussion with Fanglei Lin on the CSR and other collective effects in the ERL-based XFELO machine design which she is preparing as her LDRD proposal for the SNS

Edy Nissen

Previous two weeks (Mar 14 – Mar 25)

- Beam-beam working group meeting
- Went through paperwork for NIM paper
- Worked on Fusion cross section design
- Continue to work on raster for Hall D
- Attend Hall D beam line working group

Next two weeks (Mar 28 – Apr 8)

- Attend require OPS/Btem meetings
- Attend Beam-beam and RCS meetings
- Work on Fusion cross section calculations for IPAC paper
- Work on Raster project for Hall D
- Attend Hall D Beamline working group meeting

March 31, 2022 REPORT | MAR 14 – APR 8
DIRECTOR: TODD SATOGATA

Chris Tennant

Previous two weeks (Mar 14 – Mar 25)

- AI FOA: coordination meetings (project-wide, field emission, fault prediction)
- LD2202: onboard new graduate student, good progress on visualizing CEBAF injector setups
- R&D FOA Proposal: finalize budget, budget justification, final edits
- RADSA2: Tracking down changes in dataset distributions
- S&T Training
- Tunnel walk-through training
- develop data visualizations (comparing a dataset from different times)
- participate in, and give talk at, "Robotics Use in Accelerators, Targets, and Detectors" workshop

Next two weeks (Mar 28 – Apr 8)

- AI FOA: Coordination meetings (project-wide, field emission, fault prediction)
- LD2202: meet with UVA, good progress on visualizing CEBAF injector setups
- RADSA2: training model with additional (historical) data and testing on new data
- R&D FOA proposal: finalize budget, budget justification, final edits
- Invited to join steering committee for Digital Engineering Conference (INL)
- Preparing AI highlight slides for Manouchehr
- Preparing JLab robotics slides/text for Manouchehr
- Training
- Final FOA push (forms, budgets)
- vacation

Lasitha Vidyaratne

Previous two weeks (Mar 14 – Mar 25)

- SRF cavity fault classification: Investigate the performance difference observed when used with data from different runs
    - Transfer learning on classification layers investigated using a subset of current run data
    - Experiments on fine-tuning all layers with subsets of current run data
        - Results for fie-tuning show marginal performance improvements over transfer learning
    - Discarding the first few weeks of latest run data from analysis, then repeat above
- AIFOA1 fault prediction: Explore/familiarize with scope mode data gathered from C100 cavities
    - Work with PhD student (Monibor) on analyzing the current model performance
        - Improvements to the architecture: Variational AE, hyperparameter optimization
        - UNet architecture for performance comparison
        -
- Malachi SUF_SNS anomaly detection:
    - Incrementally adding data from new modules with data cleaning and preprocessing
        - Obtained new data recorded from additional HVCM modules from Oak Ridge SNS
        - Data from nine HVCM modules added to the training/testing set
            - Still shows good performance
    - Hyperparameter optimization and architectural updates for the branched autoencoder model
        - Additional changes to layer wise feature map size, and latent vector size for accurate representation learning from multiple module data

Next two weeks (Mar 28 – Apr 8)

- SRF cavity fault classification: Investigate the performance difference observed when used with data from different runs
    - Perform analysis with updated dataset D (discarding the recordings in the first few weeks due to inconsistencies)
    - Experiment to analyze potential changes in data over time
        - Expanding and moving window based analyses
- AIFOA1 fault prediction:
    - Work with PhD student (Monibor) on analyzing the AE model performance
        - Compare performance with UNet model
        - Experiment with small time windows: 100ms versus 300ms
- Malachi SUF_SNS anomaly detection
    - Obtained new data recorded from additional HVCM modules from Oak Ridge SNS
        - Preprocessing new data to include in the analysis
    - Hyperparameter optimization and architectural updates for the branched autoencoder model
        - Additional changes to layer wise feature map size, and latent vector size for accurate representation learning from multiple module data

Accelerator R & D - Yuhong Zhang

Yuhong Zhang
Previous two weeks (Feb 28 – Mar 11)

-

Next two weeks (Mar 14 – Mar 25)

-

Kirsten Deitrick
Previous two weeks (Mar 14 – Mar 25)

- Lower energy configuration for ERL with new injector beam
    - Longer linac version, more flexibility with initial beam parameters
    - 8 dipole configuration presented in EIC Cooler Lattice meeting
- FFA cell lattice for FFA@CEBAF
    - Presentation delayed by FOA proposal
- FFA FOA proposal
- S&T Matrix training
- Research integrity policy working group headed by David Deam
- Meetings: CASA Coffee, JLab EIC, EIC Weekly, EIC Coffee, Strong Hadron Cooling, EIC Cooler Lattice, FFA@CEBAF, Research Integrity Policy, Accelerator Seminar (Xi Li)

Next two weeks (Mar 28 – Apr 8)

- Lower energy configuration for ERL with new injector beam
    - Longer linac version, more flexibility with initial beam parameters; 6 dipoles and 4 dipoles configurations
- Presentation delayed by FOA proposal

- Unrealistic SR energy loss
- FFA FOA proposal
- Meetings: CASA Coffee, JLab EIC, EIC Weekly, EIC Coffee, Strong Hadron Cooling, EIC Cooler Lattice, FFA@CEBAF, Accelerator Seminar (Geoff Krafft)

Bhawin Dhital
Previous two weeks (Mar 14 – Mar 25)

- Was working to figure out the cooling requirements in a dual energy storage ring cooler
- Was working on thesis writing

Next two weeks (Mar 28 – Apr 8)

- Will continue on thesis writing and on cooling simulations in a dual energy storage ring
- Will work on IPAC'22 papers

Amy Sy
Previous two weeks (Mar 14 – Mar 25)

- Laser particulate counter: Discussions with internal JLab colleagues and OSP on technical objectives for contract completion. Working with J. Gubeli and Detector Group colleagues on opening up the test chamber to start conducting characterization studies of the detector, starting with reflective surface studies. Relocated the test setup to Lab 2 in the LERF for ease of testing in a more controlled environment. Gave an update on the laser particulate counter status at the Linac PIT meeting on 3/21.
- Positrons: Toured the injector beamline with J. Grames to start thinking about an LDRD proposal for sending degraded electron beams into CEBAF. The degrader components will likely be in the 5D beamline of the injector. Contributed 1-2 slides on a positron spin rotator concept to J. Grames' positron talk at the J-Future workshop.

Next two weeks (Mar 28 – Apr 8)

- Laser particulate counter: Working on MATLAB remote control of the translation stage in the new test setup. Anticipating a vendor visit during the week of 4/4 to finish the system install in the new space.
- Positrons: Set up regular biweekly meeting for positron spin rotator work - first meeting this week. Working on putting together LDRD preliminary proposal for assessing CEBAF with degraded electron beams.

Computational Physics - Yves Roblin

Yves Roblin
Previous two weeks (Mar 14 – Mar 25)

- Hall A target Alignment procedural development for He3 experiment
- BTEAM meetings and coordination
- Positron source meetings
- Training
- Edits to Springer book exercises section
- Preparing Zgoubi decks for CEBAF in order to look at spin diffusion in case of large momentum spread (FFA project and also positron beams)

March 31, 2022 REPORT | MAR 14 – APR 8
DIRECTOR: TODD SATOGATA

Next two weeks (Mar 28 – Apr 8)

- Bteam coordination and meetings
- Positron project meetings
- Mentoring PhD student on positron project
- Preparing optics for next run
- Target alignment procedural development for Hall A upcoming He3 exp.
- Raster pattern optimization/hall a

Randi Gamage

Previous two weeks (Mar 14 – Mar 25)

-

Next two weeks (Mar 28 – Apr 8)

-

River Huang

Previous two weeks (Mar 14 – Mar 25)

- EIC Beam-Beam project: continuing adjusting the parameters of the crab cavities and studying the emittance growth rate, checking the dynamic status of HSR and the betatron tunes for different configurations.

Next two weeks (Mar 28 – Apr 8)

- Continue working on EIC Beam-Beam project

Isurumali Neththikumara

Previous two weeks (Feb 14 – Mar 25)

- Edit IPAC paper draft
- Worked on suppressing the beta peak at ARC 4 & ARC 5
- Continue writing the paper on NSGA optimization
- Design and submitted a poster for ODU-GRAD event

Next two weeks (Mar 28 – Apr 8)

- Continue working on ARCs 6, 7, 8 & 9
- Continue writing NSGA optimization on lattice optics paper

Dennis Turner

Previous two weeks (Mar 14 – Mar 25)

- HLA
    - Ced2elegant bugfix for pass selection with -zone option
    - rayTrace
        - Read literature on SVD for noise reduction
        - Apply SVD for BPM noise reduction
        - Other improvements and tweaks
        - Documentation updates
- Interview panel for new LLAPS hire
- Elegant2ced development; audit tools, etc
- AI FOA

    - Data labelling and model development
- LCLS-II
    - Attend LCLS-II commissioning meeting
    - Go over available training material
- Attended S&T Risk Matrix Training
- Attend SRF-RF Ops Meeting
- Attend Accelerator Seminar
- Attended 0800, BTeam, AI FOA, CASA, PPB meetings

Next two weeks (Mar 28 – Apr 8)

- HLA
    - Assisted Michele with troubleshooting problems with the rfModDownload tool
    - Continued improvements to rayTrace analyzer
    - qsUtility tweaks and documentation updates
    - ced2elegant tweaks and documentation updates
- AI FOA
    - Moved fsdFilter tool into CSUE for release into production
    - Data labeling and model training
    - Received advice and pointers to data from Tom Powers to help with RF anomaly detection
    - Develop slides to present progress to the AI FOA group
- Attended MCC photshoot for Tom Oren
- Attended Accelerator Seminars
- Completed interview process for new LLAPS hire
- Read Serkan Golge's thesis regarding admittance measurements at CEBAF
- Property Validation
- Attended 0800, BTeam, CASA, AI FOA, PPB, SRF/RF Ops, LCLS-II commissioning, UITF meetings
- Discuss involvement with FFA LDRD with Ryan

He Zhang

Previous two weeks (Mar 14 – Mar 25)

- Finished the proposal on particle-based simulation for electron cooling
- Start RF data analysis for Q value

Next two weeks (Mar 28 – Apr 8)

- Make an example of pyJSPEC working together with BMAD
- Write a note on how JSPEC carries out IBS rate calculation
- Continue writing the FMM paper

Diagnostic Development - Kevin Jordan

Kevin Jordan

Previous two weeks (Mar 14 – Mar 25)

- Getting ready to officially start the Helium mass flow meter SBIR - waiting on account setup but I have been in discussions w/ George Biallas

- Started my PD stint. I have/will present "A look back…" each day to give a trip down memory lane as a number of folks are retiring.
- Working on FOA Proposal for vertical slice test of 1497 MHz magnetron tied to SRF cavity in LERF
- Continue with magnetron work in lab 1

Next two weeks (Mar 28 – Apr 8)

- Complete FOA
- Continue w/ Magnetron
- Finish my PD stint

Joe Gubeli

Previous two weeks (Mar 14 – Mar 25)

- ARDDOT - 3D printer finally working well! The issue was indeed the plastic extruder. I have printed out parts almost non-stop once the printer was fixed. Completed print jobs includes RADCON's dosimeter rack, LED illuminator ring for CEBAF viewers and components for the Laser Particle Counter (LPC) experiment in Lab 2. Completed assemble of the LPC test setup in Lab 2. This setup allows for both a quick (less controlled) and slow (more controlled) insertion of test materials in into the laser curtain. The insertion also has XYZ micrometer control to position test materials on a specific point on the laser array. The reflective surface is on a translation stage as well as a kinematic mount. With help for the LPC vendor and some members of the group we moved the LPC hardware from the Test lab to my diagnostics lab in the LERF. This move has several advantages including better vibration stability, lower air currents and easy access to support equipment. The vendor connected four of the 48 channels and we performed some initial tests. I purchased and received fiber end cleaners (male and female) a power meter and optical circulator. All the other channels will be connected next week now that we can clean the fibers and check power readings. I setup a small DC servo actuator and controller for Amy S. to start programming for the LPC experiment. I made a model of two H-bend WR1500 waveguides and the LERF penetration to see if we could run this much larger waveguide from the Gallery to the Vault. The WR1500 waveguide will fit and we can test EIC RF in the LERF. Started working on ISR3C12. This worked didn't get too far as there seems to be a discrepancy in the beam path through MJA3C08. Working with Michael T. and Brian F. to resolve the differences as well as the minimum clearance needed between the beam and mirror.

Next two weeks (Mar 28 – Apr 8)

- ARDDOT – Work on the LPC set and CEBAF diagnostics

Michael Tiefenback

Previous two weeks (Mar 14 – Mar 25)

-

Next two weeks (Mar 28 – Apr 8)

-

CASA Fellows

LERF - Steve Benson

Previous two weeks (Mar 14 – Mar 25)

March 31, 2022 REPORT | MAR 14 – APR 8
DIRECTOR: TODD SATOGATA

- Reviewed and selected some SULI candidates
- Took S&T Risk Matrix training
- Attended Technical Control Board review of SHC move
- Developed specifications for new ERL building vis-a-vis vibration damping and isolation.
- Reviewed White paper for Snowmass meeting
- Inspected Drive laser clean room for Laser safety checklist
- Gave tour of LERF vault to David Dean.

Next two weeks (Mar 28 – Apr 8)

- Hold third ERL 2022 SPC meeting
- Specify magnet design and numbers for the EIC ERL
- Modify training for LERF Safety awareness
- Update training for User Lab 4 users
- Rewrite and submit the LOSP for User Lab 4
- Finish up harmonic RF tech. note
- Go over SHC ERL schedule and update if possible

Andrew Hutton

Previous two weeks (Mar 14 – Mar 25)

- ERL Panel: The long report is making headway, we are now planning to submit it to Physical Review Accelerators and Beams, which will accept long publications and has a reasonable impact factor. The Accelerator R&D Roadmap was published as a CERN Yellow Report (but has a green cover!), Kim is trying to work out how the JLab staff who worked on it can get credit. I had some back-and-forth with Dave Newbold, the Chair of the European lab Directors Group about speeding up the implementation plan. He replied "While you guys are pushing the gas, there are LDG members now pushing the brakes!" Not exactly encouraging! The LDG now needs to submit their suggestions to the CERN Scientific policy Committee for approval.
- VIN Hub: A lot of activity aimed at completing the proposal in time to be funded by the Commonwealth. Apparently, David Dean told them that the Jefferson Lab logo can be used and that he was happy to represent the lab on the proposal (he did not inform me of this). Before this, I had requested permission from Stuart, David and Andrei to work on the VIN Hub proposal, specifically the ADMIRE ADS test, but I have not heard back. I have looked around for commercial accelerators that might be suitable, including calculating the expected total neutron flux.
- Loida is making fantastic progress, she now has managed to link up her part of the SNIPP program with Lila's and is churning out results. I am sure this will be the "definitive" paper on the topic, so it should go to a refereed journal with a good impact rating. I need to research the options - I am not an expert on isotope publications!

Next two weeks (Mar 28 – Apr 8)

- IPAC: I was not funded to go to IPAC2022 in Bangkok, I asked Bettina Kuske to present it. We agreed that she would prepare the slides - but that I would prepare the paper. So that will be one of my tasks in the next few weeks. All the work, but none of the pleasure!
- Graduate School Update: Lila has now been accepted at Berkeley and thinks that she will accept that offer. She will be working on isotope production - a pleasant surprise. Loida has been accepted into several universities in Florida and it looks like she will opt for Florida University. She wants the warm weather and an hispanic student population.
- Loida: I will also be helping Loida with her IPAC presentation (she is already most of the way there from her previous presentations) and also her paper. I want her to write it (good trying) but I will need to oversee it.