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DIRECTOR: TODD SATOGATA

Todd Satogata

Previous two weeks (Feb 14 – Feb 25)

- EIC Meetings (management, RF, crab, cooling, impedance, team, R&D, beam-beam)
- EIC BNL Meetings (Ferdinand and L2s, Design/R&D leadership)
- EIC Paper review for Silvia Verdu-Andres, Andrei (Feb 18)
- EIC TDR planning, chapter editor meetings
- EIC Rongli Geng meeting (Feb 16)
- EIC ERL optical lattice meeting (Feb 22)
- EIC Critical hire update planning, meeting (Feb 24), 6.02 cost/sched (Feb 24)
- EIC Fri Physics meeting R&D update (Feb 18)
- EIC Update PSQ@EIC white paper second IR section (with R. Gamage, Feb 18)
- SERVICE Review APS April meeting student grant applications
- SERVICE MSU EIC Seminar and staff meetings (Feb 23)
- SERVICE Update Snowmass education/outreach white paper
- MGMT Meetings (Leadership/Dept Heads, CASA coffee)
- MGMT All-hands JLab meeting (Feb 22)

Next two weeks (Feb 28 – Mar 11)

- EIC Meetings (management, RF, crab cooling, impedance team, R&D, beam-beam)
- EIC BNL Meetings (Ferdinand and L2s, Design/R&D leadership)
- EIC TDR planning, chapter editor meetings
- EIC Update PSQ@EIC white paper second IR section (with R. Gamage)
- MGMT Meetings (Leadership/Dept Heads, CASA coffee)
- MGMT Proton radiotherapy FOA meet (Mar 2)
- MGMT Andrew Hutton term renewal emails
- ADMIN Reach out to SuperKEKB beam physics task force
- ODU Faculty meeting (Mar 1); Isurumali fall 2021 grade update
- ODU Nomination for Alumni 40 under 40 program
- SERVICE Update snowmass education/outreach white paper
- SERVICE APS DPB Education, Outreach, Diversity Committee (Mar 11)
- VACATION Mar 4-7

Alex Bogacz

Previous two weeks (Feb 14 – Feb 25)

- USPAS course teaching and recitations
- FFA@CEBAF collaborative work
- Conducting Grad. Student Annual Review
- Meetings on PERLE lattice with GSI and IJCLAB post-docs

Next two weeks (Feb 28 – Mar 11)

- FFA@CEBAF collaborative work
- Preparing a joint FOA with BNL and Cornell
- VACATION

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Ryan Bodenstein

Previous two weeks (Feb 14 – Feb 25)

- Various OPS related meetings

- FFA@CEBAF collab work
  - Translation to BMAD
  - Working on re-designing the spreaders for the 650 MeV injector
- Positron/FFA liaison work
- Student Guidance
- LDRD work
  - Good progress with Alex C and Kitty
  - Met with Todd, Alex, Spata to discuss progress and delays without staffing
- DEI meetings

Next two weeks (Feb 28 – Mar 11)

- Various OPS related meetings
- FFA@CEBAF collab work
  - Translation to BMAD: testing code from David Saga
  - Working on re-designing the spreaders for the 650 MeV injector
- Positron/FFA liaison work
  - Will be working on magnet reversal for positrons and linking positrons with 24 GeV
- Student Guidance
- LDRD work
- Hall C walkthrough training completed – scheduling for Hall D as well
- DEI meetings/training

Rui Li

Previous two weeks (Feb 14 – Feb 25)

- Develop new data processing method to check behavior for different coupled-bunch mode for the TCBI in the eSR
  - Tried several data processing approaches, found interesting data behavior that requires special processing treatments
- Going over some literature on Vlasov analysis for coherent beam-beam effects

Next two weeks (Feb 28 – Mar 11)

- Going over some literatures about TCBI theory/simulation/measurement
- Playing with my TCBI simulation and get a better feel of the behaviors of the output data
- Continue with TCBI data processing

Edy Nissen

Previous two weeks (Feb 14 – Feb 25)

- Attended required ops/bteam meetings
- Hall D beam line working group meeting
- Attended part of GlueX collaboration meeting
- Submitted responses to reviewer comments for DODGE paper
- Worked on Hall D Raster
- Vacation 2/25

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Next two weeks (Feb 28 – Mar 11)

- Some cleanup work on Hall D Raster
- Required ops/bteam meetings
- RCS working group meeting
- Working on GHOST Collider
- Will work on Fusion cross section design

Chris Tennant

Previous two weeks (Feb 14 – Feb 25)

- AI FOA: multiple meetings, ways to approach the fact that model performance degrades over time in real-world applications, look into pre-training and fine-tuning, out-of-distribution methods
- Graph LDRD: getting injector vacuum signals sorted, generating graphs for "bad" setups, JLab collaborator meeting, UVA collaborator meeting
- Software development and creating computing environments (making PyCharm play nice with Conda)
- R&D FOA Proposal: firm up budget, division of labor, assess tunnel network needs, narrative editing
- Present Monibor's progress at Grad Student meeting
- Participate in final AI@DOE workshop event (Ethics in AI)
- All-hands meeting

Next two weeks (Feb 28 – Mar 11)

- AI FOA: Coordination meetings (project-wide, field emission, fault prediction), understanding results of binary classifier and planning next steps
- Graph LDRD: Working through UVA code to understand, configuring software workflow on my end
- SBIR: re-train models and test on beam studies data
- R&D FOA: firm up budget with vendor quotes
- CEBAF tour
- Prepare talk for Robotics workshop

Lasitha Vidyaratne

Previous two weeks (Feb 14 – Feb 25)

- SRF cavity fault classification: Investigate the performance difference observed when used with data from different runs
    - Switch to DL models that are capable of transfer learning
    - Obtain baseline performance for trained model applied on data from a new run
    - Apply transfer learning with a subset of new run data to improve performance
    - Research other methods such as domain adaptation to address this issue
- AIFOA1 fault prediction: Explore/familiarize with scope mode data gathered from C100 cavities
    - Work with PhD student (Monibor) on analyzing the current model performance
        - Reconstruction error ROC curve with thresholding for accuracy
        - Formulated a statistical approach as benchmark for fault prediction
- Malachi SUF_SNS anomaly detection:
    - Module based data weighting for imbalanced module dataset
    - Implement a K-fold CV scheme for branched autoencoder model

- Malachi SUF_SNS anomaly detection: implement data cleaning and preprocessing for new data from different HVCM modules

Next two weeks (Feb 28 – Mar 11)

- SRF cavity fault classification: Investigate the performance difference observed when used with data from different runs
    - Formulated the experimental steps to investigate transfer learning
    - Working on model training/testing
- AIFOA1 fault prediction: Explore/familiarize with scope mode data gathered from C100 cavities
    - Work with PhD student (Monibor) on analyzing the current model performance
        - Formulating incremental updates to the current AE model architecture for better performance
        - Detailed performance comparison with statistical baseline
- Malachi SUF_SNS anomaly detection
    - Hyperparameter optimization and architectural updates for the branched autoencoder model
        - Updates to the encoder section by incorporating ResNet modules in place for Conv 1D
    - Updated module based data weighting to include additional data from other modules
    - Updated the K-fold CV scheme with Malachi's input to use maximum amount of training data through folds
- Malachi SUF_SNS anomaly detection
    - Incrementally adding data from new modules with data cleaning and preprocessing

Accelerator R & D - Yuhong Zhang

Yuhong Zhang

Previous two weeks (Feb 14 – Feb 25)

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Next two weeks (Feb 28 – Mar 11)

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Kirsten Deitrick

Previous two weeks (Feb 14 – Feb 25)

- USPAS finished
- Lower energy configuration for ERL with new injector beam
- Microbunching lattice conversion
- Research integrity policy working group headed by David Dean
- FFA cell lattice for FFA@CEBAF
- Meetings: CASA Coffee, JLab EIC, EIC Weekly, EIC Coffee, Strong Hadron Cooling, EIC Cooler Lattice, FFA@CEBAF, Research Integrity Policy

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Next two weeks (Feb 28 – Mar 11)

- Lower energy configuration for ERL with new injector beam
    - Present zigzag stretcher optics on Mar 8
- Microbunching lattice conversion
- Research integrity policy working group headed by David Dean
- FFA cell lattice for FFA@CEBAF
- Meetings: CASA Coffee, JLab EIC, EIC Weekly, EIC Coffee, Strong Hadron Cooling, EIC Cooler Lattice, FFA@CEBAF, Research Integrity Policy

Bhawin Dhital

Previous two weeks (Feb 14 – Feb 25)

- Was working on PRAB paper on dual energy storage ring cooler design.
- Was working on thesis writing

Next two weeks (Feb 28 – Mar 11)

- Will continue PRAB paper and thesis writing on a dual energy storage ring
- Further lattice optimization of the ring

Amy Sy

Previous two weeks (Feb 14 – Feb 25)

- Laser particulate counter: Data analysis from initial 48 channel tests; initial results indicate that optimum settings were not used for the 80 um wire tests. Drafted specifications for project completion, with input from CASA and Detector Group colleagues. Discussions with CASA and Detector Group colleagues on testing procedures as we advance to the real testing phase of the project - next steps are to approximate moving particles with particles mounted on microscope glass slides, with repeatable insertion using a translation stage. Discussion with R. Geng about project status, particle approximation methods and perspectives on defining project success.
- Positrons: Discussion with J. Grames and others on specifications for spin rotators for the positron effort. Will work with F. Lin on starting the high energy (1-11 GeV) spin rotator design by starting with the JLEIC solution. Exploring the suggestion to develop a proposal to study positron depolarization due to energy spread, using energy and emittance degraded electron beams and pushing through CEBAF. Electron beams would be degraded with a series of thin foils at an appropriate location in the injector beamline.

Next two weeks (Feb 28 – Mar 11)

- Laser particulate counter: Initial tests with a translation stage and microscope glass slides. Particle "samples" provided by K. Jordan that feature < 100 micron specks in a ~2 mm vertical stripe on a glass slide. The translation stage has a maximum speed of 2.4 mm/s. Took background data with blank glass slides and translation across all four laser beam arrays. Took initial data using the particle slide and working on analyzing the initial data. OSP has indicated that the translation speed of 2.4 mm/s is likely too slow for the system to be able to resolve, due to the nature of the stabilization algorithms on the lasers. During initial testing, observed complete signal loss from one sensor - this sensor module and a second module has been sent back to the vendor for further testing to prevent similar issues in the future. Will meet with OSP and JLab colleagues to discuss the steps toward contract completion.

- Positrons: Working with the JLEIC universal spin rotator lattice as an initial starting point for the positron spin rotator design. Continued literature study on spin rotator theory. For the positron depolarization studies, looked back into past work on electron multiple scattering through thin targets (context in this case was isotope production in an ERL) for relevance. Will try to set up an injector tour with J. Grames for better familiarity with the proposed location of the degrader components.

Computational Physics - Yves Roblin

Yves Roblin

Previous two weeks (Feb 14 – Feb 25)

- Optics decks rework and review
    - Review for Troubleshooting guide and continuing work on ORFP rewrites
    - Positron source meetings
        - Mentoring student for positron simulations
    - FFA decks translation
- Learning BMAD
    - BMAD learning/work with D. Sagan on developing translator from ELEGANT to BMAD
    - 24 GeV CEBAF FFA discussions, in particular optimal linac gain and S/R redesigns
- BTEAM meetings and coordination
- Meetings on the possibility of adding spin rotators to CEBAF

Next two weeks (Feb 28 – Mar 11)

- 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)

Randi Gamage

Previous two weeks (Feb 14 – Feb 25)

-

Next two weeks (Feb 28 – Mar 11)

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River Huang

Previous two weeks (Feb 14 – Feb 25)

- In our studied for the emittance growth rate in the JLEIC ion ring, we found that, with fixed voltage of the RF cavity of the ring, the simulation results show that: when cavities are turned on without the phase noise, the transverse emittance increase/decrease linearly depending the voltage value of the crab cavities. I also found that, without the phase noise, when introducing the ramping process of the voltage to the crab cavities starting from different steps in the simulations,

  the changes of emittance growth rate are significantly. Due to the mismatch of bunched beam, the transvers emittance growth rate is very large in the initial thousands of turns for a beam… and etc.… Working with our colleagues, now I am trying to understand what we found and also trying to figure out the problems what we found in our studies.

Next two weeks (Feb 28 – Mar 11)

- Continue working on EIC Beam-Beam project

Isurumali Neththikumara

Previous two weeks (Feb 14 – Feb 25)

- Continued working as TA for the USPAS Accelerator Physics class – winter 2022
- Drafted a paper for IPAC'22 on multi-objective optimization for ERL optics optimization

Next two weeks (Feb 28 – Mar 11)

- Redo the rescaling of ARCs using OptiM, trying to suppress the horizontal beta peak at spreader section
- Try to adjust MOO-EA search for north linac adding constraints for linac end alpha values

Dennis Turner

Previous two weeks (Feb 14 – Feb 25)

- AI
  - Continue MYA data labeling and model development
  - Reading literature on anomaly detection and autoencoders
- CED Import
  - Tweaks to elegant2ced
  - Resurrect arcOpticsAudit to include in CED import
- UITF
  - Assemble data and write contribution to the upcoming UITF paper
  - Learning TikZ, pgfplots, etc in the process
- rayTrace
    - Continue debugging and improving the analyzer tool
- Assisted with KeyWatcher questions from Ops
- Pre-interview panel meeting for upcoming LLAPS hire
- Attended All Hands Meeting
- Attended Max Bruker's talks on LaTeX, TikZ, etc
- Attended 0800, BTeam, UITF, AI FOA, PPB meetings

Next two weeks (Feb 28 – Mar 11)

- HLA
  - rayTrace
    - Tweaks to the data collector tool
    - Analyzer debug and improvements
  - qsUtility
    - Finished making changes to account for counterwound solenoids
  - QTSnyder
    - Finished rewriting for RHEL7
  - ced2elegant
    - Documentation updates
- Interview panel for new LLAPS hire
- AI FOA
  - Continued arichiver data collection and labeling
  - Continued model development
  - Read literature on anomaly detection with deep learning
  - Attended MLFlow trainingUITF
- Attended MLFlow training
- Attended Max Bruker's talks on LaTeX, etc
- Attended 0800, BTeam, AI FOA, PPB meetings
- Attend LCLS-II commissioning meeting

He Zhang

Previous two weeks (Feb 14 – Feb 25)

- pyJSPEC: cooling rate calculator and simulator work
- JSPEC: fixed small bugs
- Continue analyzing RF fault data
- Writing on quantum computing

Next two weeks (Feb 28 – Mar 11)

- Finish my part on quantum computing for snowmass white paper
- pyJSPEC: how to work with other codes, such as BMAD.
- Write a note on how JSPEC carries out IBS rate calculation.
- Continue RF fault data analysis.
- Continue writing the FMM paper.
- Continue study BLonD and longitudinal dynamics.

Diagnostic Development - Kevin Jordan

Kevin Jordan

Previous two weeks (Feb 14 – Feb 25)

- Kickoff for the helium mass flow SBIR
- More prep for IBIC

- Prepare for magnetron injection locking experiments

Next two weeks (Feb 28 – Mar 11)

- Continued preparations for next weeks IBIC PC meeting. Sending our Faraday Cup nominations & proposing invited talks.
- Continued magnetron transmitter tests. Since Facilities did not get the chilled water updated I had Carroll Jones reduce the LERF LCW temperature to 78˚F, this should be above dew point so pipes won't sweat but can provide cooling for all of the planned magnetron work (2 transmitters & loads).
- Assisted in preparing for power outage to service power panels & breakers.. Turns out the 2,000 Amp clean power breaker had failed 'ON', it was removed & repaired to be re-installed on 2/8/22.
- Found all but one item on my property validation - that item was added to my list this year. It was on admin list meaning I did not ever have to locate it before. The last time I saw it was in the Arc lab.
- Had discussions with SRF & Facilities about future EIC cavity testing. The LERF has ample AC power & LCW available without modification - Facilities is looking at multiple $M to upgrade test lab facilities…
- Preparing for PD stint in two weeks, preparing slide shows (near daily) of "A Look Back in Time…"
- Walked tunnel with Joe inspecting diagnostics, in particular X-Ray damage to arc 7 SLMs.

Joe Gubeli

Previous two weeks (Feb 14 – Feb 25)

- ARDDOT - Still waiting on parts to repair the 3D printer. There are several projects that are stalled until this printer is fixed. Projects like the RADCON Dosimeter prototype, the Filter Wheel upgrade and the Viewer imager modification for the older style viewport. Spent a considerable about of time reloading software on the new laptop. Seems like it should have been a simple process but it was not for two of the three programs installed. The video card is not certified by Solidworks which results in limiting needed software functionality. I tested several registry modifications and was able to regain all of the software's functionality. I am still working with COMSOL and our Procurement department to resolve a licensing issue. ZEMAX install without issue. Made a presentation on the testing of the ISR7A08 optical rail. The Diagnostics Group is still discussing our next step. Spent some time learning a new feature of COMSOL/Solidworks called One Window. This allow COMSOL to run within Solidworks.

Next two weeks (Feb 28 – Mar 11)

- ARDDOT – Will be on vacation all of next week

Michael Tiefenback

Previous two weeks (Feb 14 – Feb 25)

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Next two weeks (Feb 28 – Mar 11)

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CASA Fellows

LERF - Steve Benson

Previous two weeks (Feb 14 – Feb 25)

- Schedule third SPC meeting for Feb. 25th
- Organized and ran SPC meeting
- Reviewed FEL 2022 abstracts
- Developed input for LaTeX seminar
- Completed Radiation Safety training
- Worked on resolving property issues
- Presented strategy for resolution of ERL cryomodule design for Preble, Smith, and Willeke
- Continued looking over I&C needs for the cooler ERL

Next two weeks (Feb 28 – Mar 11)

- Check on status of TRIUMF meeting approval
- Develop personnel needs and definitions for the ERL program
- Rewrite and submit the LOSP for User Lab 4
- Update training for User Lab 4 users
- Finish up harmonic RF tech. note
- Go over SHC ERL schedule and update if possible
- Host tour of David Dean at the LERF

Andrew Hutton

Previous two weeks (Feb 14 – Feb 25)

- Loida is making progress with the program. She was invited to speak at a DOE Nuclear Data quarterly call on February 22 - a big deal! She did extremely well and had the heads of the isotope programs at BNL, Los Alamos and Berkeley all trying to hire her into their graduate programs. I was proud!
- ERL Panel: No time, no progress! Max will now be out for at least 3 months
- DOE Review of LEAF: I spent three days on a DOE review of the Argonne Isotope Program. The LEAF is in big trouble. The accelerator has had several major failures (old equipment and in case operator error). The air conditioning ducts were being cleaned out in another part of the building and blew black residue into the hot cell and all over the vault. They have not been able to return to reliable purification of the Cu67 and the DOE has halted sales, resulting in a loss of income. They need much more structure than they have!
- Sustainability Conferences: I missed most of the IAEA Sustainability conference organizing committee meeting as I was double booked with the LEAF Review. They now have a full program with significantly larger involvement from the developing countries. I am also invited to talk at the Sixth Workshop on Energy for Sustainable Science at Research Infrastructures hosted by the ESRF in Grenoble, which has been rescheduled to 29-30 September 2022 due to the ongoing sanitary crisis. I attended the first meeting of the ICFA Panel for Sustainable Accelerators and Colliders, which has been mainly focused on Europe. With Thomas Roser taking the Chair, he is trying to collect up all of the sustainability efforts in the world. I suggested that the write to the all the lab Directors in the US to ask for a status of their sustainability work. While I know about some of the work at Jefferson Lab (magnetrons, Nb3Sn coatings, etc.), I do

not have the wider picture. I assume this request for information will trickle down through the ADs.

- VNECA: I contacted a Swiss company, Transmutex, which is developing an ADS program. April Wade (Energy) and Ali Haghighat (Tech) met via Zoom with the President, Franklin Servan-Schriber to discuss possible collaboration. I think it is going to go very positively. The Hub proponents met with David Dean on February 27, a pleasant discussion which did not result in any concrete action.
- Cryo Test: I have proposed a test of the JLab cryogenic plant to see if it will operate with the rf gated on for 2 seconds and off for 4 seconds. The initial meeting with Curt Hovater and his group as well as Jonathan Creel and his group went surprisingly well.
- Ghost Collider: No time to work much on it. I have contacted a User, Peter Monaghan of ODU to ask him to solve the problem of ultra-relativistic electron-positron collisions.
- SuperKEKB Review: I attended the biannual review, which also included a long list of world experts who have volunteered in Task Forces to look at the problems. SuperKEKB reached a luminosity of 3.81x10^^34 with a βy* of 1mm and a current of 1 Amp. The luminosity is an order of magnitude less than the design, and has stalled - not good. There are multiple problems in the optics, beam blow-up, instabilities, etc. Not good news for our field.

Next two weeks (Feb 28 – Mar 11)

- ERL Panel: I have spent a lot of time, and will be spending more, to finish up the long report. I have been working a lot with Max B. It is a long slog, really miserable work that just has to be done. Apparently, there is some slow progress on organizing the implementation plan; I am waiting for more details. No time, no progress! Max will now be out for at least 3 months
- Cryo Test: Next meeting on March 9 when we will look at all of the technical details.
- VIN Hub: The war in Ukraine will have an impact on Transmutex, who had been working with a lab in Kharkiv and with Rosatom, the Russian nuclear power company. This may increase our chances of attracting them to Virginia.