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DIRECTOR: TODD SATOGATA

Todd Satogata

Previous two weeks (Jan 31 – Feb 11)

- EIC Meetings (management, RF, crab, cooling, impedance, team, R&D, beam-beam)
- EIC BNL Meetings (Ferdinand and L2s, Design/R&D leadership)
- EIC Strong Hadron Cooling review (Feb 2-3)
- EIC TDR planning, editorial board kickoff (Feb 4)
- EIC Risk workshop (Feb 8)
- SERVICE APS DPB virtual community meeting (Feb 10)
- SERVICE APS DPB EOD monthly (Feb 10)
- MGMT Meetings (Leadership/Dept Heads, CASA coffee)
- MGMT JSA Monthly update for division office
- MGMT Planning (David Dean meet/greet, etc)

Next 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 Strong Hadron Cooling review (Feb 2-3)
- EIC TDR planning, chapter editor meetings
- EIC Paper review for Silvia Verdu-Andres, Andrei (Feb 18)
- 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)
- MGMT Meetings (Leadership/Dept Heads, CASA coffee)
- MGMT All-hands JLab meeting (Feb 22)
- SERVICE Review APS April meeting student grant applications
- SERVICE MSU EIC Seminar and staff meetings (Feb 23)
- SERVICE Update snowmass education/outreach white paper

Alex Bogacz

Previous two weeks (Jan 31 – Feb 11)

- USPAS course teaching
- Ops meetings
- FFA@CEBAF collaborative work
- Preparing Grad. Student Annual Review
- Meeting with Peter Williams on PERLE filling pattern

Next 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

Ryan Bodenstein

Previous two weeks (Jan 31 – Feb 11)

- Operations meetings

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- B-Team meetings
- FFA@CEBAF collab work
    - Looking into converting elegant to BMAD
- Positron/FFA liaison work
    - Will be working on magnet reversal for positrons
- Student Guidance
- LDRD work
    - Hiring meeting for candidate
    - A bit of coding work/training
- Program Deputy extension to end of run

Next two weeks (Feb 14 – Feb 25)

- Operations meetings
- B-Team meetings
- FFA@CEBAF collab work
    - Translation to BMAD:
        - Spoke to Yves – he is working on direct translation of elegant > BMAD
        - Spoke to David Sagan and Christopher Mayes – they are working on a general elegant > BMAD translator
            - I'll be the test case
        - Currently have all CEBAF elegant decks – can translate elegant > OptiM > MADX > BMAD – not ideal, but doable
    - Working on re-designing the spreaders for the 650 MeV injector
        - OptiM for the first go, since it's simple
- Positron/FFA liaison work
    - Will be working on magnet reversal for positrons
- Student Guidance
- LDRD work
    - Regular meeting – touched base and agreed upon short term goals with current LDRD staff
        - Alex C will be wrapping up USPAS, and then will start looking at BMAD more
        - Kitty is going through USPAS notes to understand more of what we're doing
        - Everyone will update goals on the website, and start looking at BMAD
    - More BMAD "training"
- DEI meetings
- Optics On Call (but beam only in injector…so not really any work)

Rui Li

Previous two weeks (Jan 31 – Feb 11)

- New TCBI algorithm using phasor update
    - Found new parameter solutions for the TCBI with multibunches using Mathematica
    - Developed new algorithm for TCBI and implemented the algorithm in the code
    - Found good agreement between the new numerical results for the multibunch TCBI behavior and the theoretical prediction, including a negative coherent tune shift!

Next two weeks (Feb 14 – Feb 25)

- Develop new data processing to check behavior for different coupled bunch mode for the TCBI in the eSR
    - Tried several data processing approaches, and met some numerical difficulties
    - Found an approach that seems to work, so I'll continue to pursue this one

Edy Nissen

Previous two weeks (Jan 31 – Feb 11)

- Attended required ops/bteam meetings
- Hall D beam line working group meeting
- Attend required beam-beam meetings
- Initial work on Ghost Collider project

Next two weeks (Feb 14 – Feb 25)

- Finished response to reviewers for DODGE paper, awaiting final confirmation from coauthors, will submit when received
- Working on Raster issue as Hall D APEL, found issue with CED values for some Hall D experimental hall entries
- Will attend part of GlueX workshop
- Attend required RCS and Beam-beam meetings
- Will work on GHOST Collider

Chris Tennant

Previous two weeks (Jan 31 – Feb 11)

- SBIR: summary presentation of initial inverse model results
- AI FOA: working with graduate student to build training data for binary classifier
- Graph LDRD: revisit how to construct injector beamline graphs for richer structure
- Software development and creating computing environments (making PyCharm play nice with Conda)
- R&D FOA Proposal: writing narrative and project management plan, talking with SMEs across the lab, identifying appropriate diagnostic/sensors
- JLab training
- Finalize "AI in Accelerator Division" White Paper
- David Dean presentation (prep and meeting)
- General administrative tasks related to supervising (Lasitha) and mentoring (Monibor)

Next two weeks (Feb 14 – Feb 25)

- Graph LDRD: getting injector vacuum signals sorted, generating graphs for "bad" setups
- 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
- R&D FOA Proposal: Firm up budget, division of labor
- Present Monibor's progress at Grad Student meeting
- Final AI@DOE workshop event
- All-hands meeting

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Lasitha Vidyaratne

Previous two weeks (Jan 31 – Feb 11)

- Vacation
- JLab training
- SRF cavity fault classification: work on issues found in retraining the ML Classifier models with new data
    - Retrain fault classification model without "Multi Cav Turn Off"
    - Compare performance with full signal as input versus signal cropped at 2 milliseconds after fault event
- AIFOA1 fault prediction: Explore/familiarize with scope mode data gathered from C100 cavities
    - Work with PhD student (Monibor) on analyzing the current model performance and refining the autoencoder model
- Malachi SUF_SNS anomaly detection: Work on implementing a branched autoencoder model for use with multiple HVCM modules
- Malachi SUF_SNS anomaly detection: implement data cleaning and preprocessing for new data from different HVCM modules

Next 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
        - Performance on current non-overlapping window based approach
    - Overlapping window based data extraction for accuracy versus lead time analysis
- Malachi SUF_SNS anomaly detection: Hyperparameter optimization and architectural updates for the branched autoencoder model
    - 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

Accelerator R & D - Yuhong Zhang

Yuhong Zhang

Previous two weeks (Jan 31 – Feb 11)

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Next two weeks (Feb 14 – Feb 25)

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Kirsten Deitrick

Previous two weeks (Jan 31 – Feb 11)

- USPAS (Colliders for High Energy finishes, Collider IR starts)
- Strong Hadron Cooling Technical Design Review
- Continue lower energy configuration for ERL with new injector beam
- Meetings: CASA Coffee, JLab EIC, EIC Weekly, EIC Coffee, Strong Hadron Cooling, FFA@CEBAF, Research Integrity Policy

Next 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

Bhawin Dhital

Previous two weeks (Jan 31 – Feb 11)

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

Next two weeks (Feb 14 – Feb 25)

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

Amy Sy

Previous two weeks (Jan 31 – Feb 11)

- Laser particulate counter: Meetings with internal JLab colleagues and with the vendor to discuss progress since October. While the subcontract is approaching a completion point, there are questions on whether the technical progress is sufficient to declare project completion. Working with CASA colleagues and Detector group colleagues to prepare specifications for discussion with vendor. The vendor visited on Monday 2/7 for preliminary testing of all 48 channels, and some side by side testing of a newer prototype device utilizing more advanced technology that is capable of better signal to noise ratio. Initial testing using an 80 um wire on a translation stage to demonstrate that information on events with a known speed can be recovered in the data by knowing the physical separation distance between laser beams in the device.
- Starting to attend positron meetings and discuss contributions to the positron effort for FY22. Met with Y. Zhang and F. Lin to discuss future work on spin rotator design and simulation.

Next 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. Drafting 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.Starting to attend positron meetings and discuss contributions to the positron effort for FY22. Will meet with Y. Zhang and F. Lin to discuss future work on spin rotator design and simulation.

- 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.

Computational Physics - Yves Roblin

Yves Roblin

Previous two weeks (Jan 31 – Feb 11)

- Hall A winter meeting
- BTEAM coordination
- Operation support, pass change, Hall A beamline rematch
- Writing Exercise chapter for Spin physics book after Springer review
- Energy reach/FY2022-2023 run period planning
- Positron source meetings+ discussion on possible tests in CEBAF
- BMAD decks for passes 1-3 for FFA 24 GeV concept
- ELEGANT to BMAD translation, work with D. Sagan et al.

Next two weeks (Feb 14 – Feb 25)

Optics decks rework and review

- Review for Troubleshooting guide and continuing work on ORFP rewrites
- Positron source meetings
- FFA decks translation
- Learning BMAD

Randi Gamage

Previous two weeks (Jan 31 – Feb 11)

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Next two weeks (Feb 14 – Feb 25)

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River Huang

Previous two weeks (Jan 31 – Feb 11)

- EIC Beam-Beam project: working with our colleagues, we studied more details of the emittance growth of JLEIC lattices, for examples, crab cavities on/off, crab cavities voltage ramping on/off, adding noise or not, and etc.

Next two weeks (Feb 14 – Feb 25)

- Continue working on EIC Beam-Beam project

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Isurumali Neththikumara

Previous two weeks (Jan 31 – Feb 11)

- Worked as TA for the USPAS Accelerator Physics class – winter 2022

Next two weeks (Feb 14 – Feb 25)

- Continue working as a TA for USPAS Accelerator Physics class – Winter 2022
- Start to work on IPAC papers

Dennis Turner

Previous two weeks (Jan 31 – Feb 11)

- Completed Laser Safety training
- rayTrace
    - Fixed several bugs in the analyzer
    - Investigating bug in fitting for angle
    - Improved data presentation with the analyzer tool
    - Submitted ATLis for taking data with beam to ILD for PPB and match verification
- AI
    - Continue data labeling and model development
    - First DAQ chassis installed at 1L13; explore EPICS interface, etc
- Explore ExtOrb lock corrector selections
- Attend Accelerator Seminars, Software & Computing Round Table
- Attend 0800, BTeam, AI FOA, PPB meetings

Next 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 importAI
- 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, AI FOA, UITF, PPB meetings

He Zhang

Previous two weeks (Jan 31 – Feb 11)

- pyJSPEC: testing and debugging the code about the friction force calculation, cooling rate calculation, and cooling simulation.
- Analyze RF fault data and presented the initial result to the group.
- Read some latest reference on quantum computing.

Next two weeks (Feb 14 – Feb 25)

- Finish testing pyJSPEC
- Start coding the space charge effect in cooling
- Write my part on quantum computing for snowmass white paper
- Write a note on how JSPEC carries out IBS rate calculation

- Continue RF fault data analysis
- Continue writing the FMM paper
- Continue the python JSPEC development
- Continue study BLonD and longitudinal dynamics

Diagnostic Development - Kevin Jordan

Kevin Jordan

Previous two weeks (Jan 31 – Feb 11)

- Helium mass flow SBIR:
  - Completed CRADA - it is at DOE site office for sign-off
  - Account has been set up, the code is HEFLOW
  - Money has been transferred to George Biallas - he has sent the treasury JLab's portion
  - We had kickoff discussions - will meet next week to start project.
- Magnetron:
  - The PLC has been programmed for auto start-up where the solenoid & filaments are deterministically turned on & made ready for high voltage.
  - Determined the cycle time for the PLC is 2 milliseconds - that is the time from an analog read to analog out change.
  - Started to tie in the chiller to PLC control.
  - Requested the LCW temperature be lowered to 78˚F, Carroll Jones has changed the set point & we'll see how low it can go. The LERF cooling tower & LCW has a design point of 95˚F with 10˚F temperature rise max @! 700 GMP, this provides ~1MWatt of cooling - since plant did not complete the chilled water upgrade this will be the source for cooling the second magnetron transmitter.
- AWP for ARDDOT has been submitted
- IBIC PC:
  - Ongoing discussions for logistics & invited talks
  - Faraday Cup website has been updated, still some clean up to do…
- Upcoming PD:
  - Collecting photos for "A look back…" series that I will present after the daily business of the meeting is completed with a focus on Steve's retirement.
- Spent some time on the laser particle detector - a true turnkey system not looking likely
- Completed all but one item on my property validation

Next two weeks (Feb 14 – Feb 25)

- Kickoff for the helium mass flow SBIR
- More prep for IBIC
- Prepare for magnetron injection locking experiments

Joe Gubeli

Previous two weeks (Jan 31 – Feb 11)

- ARDDOT - With the start of SAD I was able to get into the tunnel and perform some work. The eight channel laser module for the Laser Particle Counter was removed from the girder between cryomodules NL21 & NL22. This was place in the tunnel to determine if there was any deterioration of performance due to radiation. Along with the module some dosimeters were placed to capture the integrated dose. I am waiting for the results of these dosimeters as well as a nearby NDX detector. Initial results of one of the dosimeters is an integrated gamma dose of 300 kRAD. Radcon surveyed the module and cleared it as OK to send to the vendor. It is currently at the vendor for testing. I spent some time with Chris N. showing him how to add the short pass filter to the viewer imagers. He added the filter to ITV1L02 during training. I removed the optical rail from ISR7A08 and set it up in the Diagnostics Lab. Other than some radiation damage to a relatively small amount of pixels the imager seem to work well. At first glance it appears that the AR coating has been stripped from the first optical element, a lens. We will discuss at the Diagnostics meeting what to do next with the assembly. I spoke with Markforged, the 3D printer vendor, and it appears that considerable more maintenance is need. The Onyx print material, a composite of nylon and carbon, is abrasive and will require the replacement of some parts. My laptop failed to boot and has been replaced. All the data on the failed laptop was recovered and is on the new machine.

Next two weeks (Feb 14 – Feb 25)

- ARDDOT – Will order some parts the repair the 3D printer. Work with the Diagnostic group on current and upgrade diagnostic projects. Reinstall a bunch of SW on the new laptop.

Michael Tiefenback

Previous two weeks (Jan 31 – Feb 11)

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Next two weeks (Feb 14 – Feb 25)

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CASA Fellows

LERF - Steve Benson

Previous two weeks (Jan 31 – Feb 11)

- Attended SHC review
- Gave presentation at the SHC review on the ERL design and responded to questions from the committee.
- Reviewed FEL Legacy and Export Control Review document and tracked down possibly FOUO hardware

- Got approval for moving funds to the harmonic kicker account
- Analyzed controls requirements for the EIC to make them more compatible with ML/AI
- Continued working on property validation.
- Reviewed IR2 change request and suggested changes
- Completed review of SHC General and Functional requirements document
- Prepared presentation for meet and greet with David Dean

Next two weeks (Feb 14 – Feb 25)

- Schedule third SPC meeting for Feb. 25th
- Go over SHC ERL schedule and update if possible
- Rewrite and submit the LOSP for User Lab 4
- Update training for User Lab 4 users
- Finish up harmonic RF tech. note
- Complete property validation

Andrew Hutton

Previous two weeks (Jan 31 – Feb 11)

- ERL Panel: everything fell apart on February 4. I had completed several of my remaining tasks for the long ERL write-up (I now only have to finish the sustainability Chapter) with Max Klein leading the effort and Max Bruker editing. On Feb 4, I heard from Max K. that he had been transported to hospital, and later that he has been ordered to rest and not to do any work for a month. So I am now filling in for him. The next step is to develop an Accelerator R&D Roadmap Implementation strategy, and the first meeting of the European Lab Directors Group (the LDG) was held on February 1 to discuss how to organize this. I replaced Max K. at the LDG Meeting, and I will be acting as the ERL Panel Chair during the difficult negotiations to obtain funding for the ERL plans. We had already decided to propose a Steering Committee to ensure that the ERL investments are coordinated and to provide oversight. The steering committee members proposed by Max would be: Max as the Panel Chair, Achille Stocchi to represent

  PERLE, Jens Knobloch to represent bERLinPro, and me to represent the technology developments. The steering committee chair would be a senior European scientist (we are thinking of Jorgen de Hondt, but he has not yet been approached). Clearly, my role in the ERL Roadmap Panel, far from decreasing, looks like it will continue, particularly with the Steering Committee which will be going on for several years.
- VNECA: I arranged a meeting between Stuart and the proponents of the Virginia Nuclear Innovation Hub (April Wade (Energy), Alireza Haghighat (VT), Supathorn Phongikaroon (VCU), Mark Horstmeyer (Liberty) and Sean Agnew (UVA)) to discuss Jefferson Lab involvement in the Hub and in particular to discuss how Jefferson Lab could be integrated into the HUB. Of specific interest to me was the ADMIRE proposal (ADMIRE = Accelerator Driven Micro Reactor). Stuart was noncommittal during the meeting, but afterwards asked David Dean to follow up. I spent 30 minutes explaining the background to David.
- ALCC: I attended a meeting where the bad news from Japan continues (methinks Leonard Skynyrd: "Ooooh that smell, Can't you smell that smell, Ooooh that smell, The smell of death surrounds you"), so the ALCC is now preparing a White Paper for Snowmass to underline the interest of HEP in any Higgs Collider, preferably one based in the US.

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- ERL Panel: No time, no progress! Max will now be out for at least 3 months

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- 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 will meet with David Dean on February 27
- Loida is making progress with the program. She has been invited to speak at a DOE Nuclear Data quarterly call on February 22- a big deal!
- 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.
- 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. Next meeting in two weeks time when we will look at all of the technical details.
- 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.