

LABORATORY UPDATE for ALUMNI



December
2018

FRIB Project sees light at end of the tunnel (literally and figuratively) as project transitions again from construction to operations

by FRIB Laboratory Director Thomas Glasmacher and NSCL Director Brad Sherrill

Happy holidays! As we celebrate the holidays and the coming of the new year, we want to take a moment to reflect with pride on all we accomplished together in 2018.

The FRIB Project remains ahead of schedule and is nearly 90 percent complete as we work diligently toward early completion in 2021. We together achieved many project milestones in 2018. We started the year marking all [FRIB cryomodules being in production](#), and now are completing more than one per month toward our goal of having all of them finished and installed by the end of 2019.

In May, we held our [second Accelerator Readiness Review \(ARR02\)](#), with the committee answering all charge questions affirmatively, contingent upon completion of pre-start recommendations. The successful ARR02 paved the way for our huge beam-commissioning milestone in July, when we accelerated our [first beams in three of forty-six cryomodules](#). The acceleration demonstrated for the first time that all of FRIB's major systems, which were commissioned individually, work well together and can successfully accelerate beams of atomic particles. In August, we successfully circulated liquid lithium in the charge stripper, [establishing our first liquid film](#). In December, we energized all cavities in linac segment 1 and cooled the 15 cryomodules in linac segment 1 to 2 Kelvin. Following the in-house design and construction of the 2 Kelvin coldbox, the cryogenic department started the 2 K system commissioning and successfully produced liquid helium of 2 K temperature on December 19. FRIB is the first superconducting radio-frequency heavy-ion accelerator to operate at 2 Kelvin.

As the FRIB Laboratory, we've marked many successes together as NSCL and the FRIB Project. In February, the MSU Board of Trustees authorized us to begin construction on two new [MSU-funded building additions](#) that will expand FRIB's discovery potential, the Cryogenic Assembly Building and the High Rigidity Spectrometer and Isotope Harvesting Vault. Both are well underway and scheduled for completion in 2019.

NSCL had an amazing year operating more than 6000 hours for research at nearly 95% availability. There were more than 200 publications (more than 16 each month) based on Laboratory work and 13 PhDs awarded in 2018. The FRIB Theory Alliance had the first two bridge positions filled. We accomplished a major cryoplant reconfiguration during the summer and continue to make great progress installing the cycstopper in N2/3 and toward ReA6.

The summer was a busy one as far as providing additional educational and outreach opportunities. MSU hosted the [summer session of the U.S. Particle Accelerator School](#), and several FRIB Laboratory researchers and experts participated as instructors. NSCL hosted the 2018 Nuclear Science Summer School, funded by NSF and JINA-CEE. Fifteen undergraduate students from eleven universities spent a week at NSCL learning about nuclear science.

Additionally, the [FRIB Theory Alliance hosted a summer school](#) called “Neutron star mergers for non-experts: GW170817 in the multi-messenger astronomy and FRIB eras.” Attendance was more than twice the expected number, with 80 attending in person and more than 20 participating online.

In our largest event of the year, FRIB and NSCL provided 4,000 tours to members of the public during the [FRIB and NSCL Open House](#) in August. One-hundred and fifty volunteers made the open house possible and the public’s response was overwhelmingly positive and enthusiastic. We continue to be grateful and humbled by the public’s support of our laboratory and take the responsibility of establishing FRIB with their tax dollars very seriously.

We are proud to leverage FRIB and NSCL to help meet the nation’s workforce development needs. The Accelerator Science and Engineering Traineeship program and the MSU Cryogenic Initiative [both marked one year of operation in 2018](#) and continue to grow and gain momentum. In total, more than 300 graduate and undergraduate students are involved in laboratory activities.

In November, as the year drew to a close, we marked one of our most significant laboratory milestones of the year, when we passed our first annual Information Security Management System audit and [received ISO 27001 registration](#). The accomplishment capped a rigorous two-year implementation period to become registered to the external information security standard.

Additionally, we were honored to host and participate in significant meetings with our advisory committees and the larger nuclear science community that help determine the laboratory’s future. In July, the [FRIB Science Advisory Committee](#) met and endorsed FRIB’s [proposed beam-energy upgrade](#) from 200 million electron-volts per nucleon (MeV/u) to at least 400 MeV/u for all ions. The science of the upgrade was further endorsed at the [2018 Low Energy Community Meeting](#) held at the FRIB Laboratory in August with 260 participants, where the group strongly supported the upgrade. They stated: “It will open new scientific opportunities and is timely given the recent [neutron-star merger observation](#).” The group is now preparing a whitepaper on the opportunities. We were also pleased to host the [Nuclear Structure conference](#) at the FRIB Laboratory in August, and look forward to the continued discussions and collaboration with the community.

We are grateful that the U.S. Department of Energy Office of Science and the National Science Foundation continue viewing us as good stewards of the nation’s precious research dollars and we strive daily to maintain this confidence. The annual [NSF site visit of NSCL](#) in August had a special focus on education, outreach, and diversity activities. The committee was positive about all the laboratory’s activities in those areas and gave NSCL high marks overall.

We ended the year on a high note with a [successful DOE-SC Office of Project Assessment review](#) of the FRIB Project. In addition to answering all charge questions affirmatively, the committee closed out the review with high praise for the FRIB Project team.

With the kind words also came cautionary advice – to not become complacent in the homestretch, and to be aware of the upcoming challenges that will arise as we transition FRIB from construction to operations and user relations and from an NSF environment to a DOE one.

In other words, we can see the light at the end of the tunnel, but we are still in the tunnel, literally and figuratively.

We assure you that we are aware of the challenges to come and will weather them with the same commitment and diligence we have for almost the last decade of the FRIB Project. We remain committed to delivering on the great responsibility we’ve been given to afford the nation the next-generation scientific user facility.

Thank you all for your support of and meaningful work, advice, and enthusiasm for FRIB this past year. Best wishes for happy holidays with your family and friends.

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Michigan State University is establishing FRIB as a national user facility for the [Office of Nuclear Physics](#) in the [U.S. Department of Energy Office of Science](#). Operation of NSCL as a national user facility is supported by the [Physics Division](#) of the [U.S. National Science Foundation](#).