

LABORATORY UPDATE for ALUMNI



June
2018

FRIB and NSCL Laboratory Directors: Letter to FRIB alumni about MSU developments

Dear FRIB Laboratory Alumni,

We want to take a moment to address significant developments at Michigan State University since [our last issue in January 2018](#).

On 24 January, Larry Nassar, a former MSU physician, was sentenced to 40 to 175 years in prison for seven counts of felony criminal sexual conduct. On 5 February, he was sentenced to an additional 40 to 125 years in prison for three counts of criminal sexual conduct in another Michigan county. More than 200 survivors of his abuse spoke during his sentencing hearings, sharing their heart-wrenching personal stories. In total, more than 260 survivors have reported being abused by Nassar.

First and foremost, we extend our sincerest sympathy to the survivors of Nassar's horrific actions, and admire and commend them for their courage in speaking out publicly. As part of the MSU community, we are deeply sorry for the abuse Nassar's victims suffered, and for the pain and anguish it caused and continues to cause.

Following Nassar's sentencing, MSU President Lou Anna K. Simon resigned. The MSU Board of Trustees named an interim president on 31 January, former Michigan Governor John Engler. President Engler assumed the role in early February.

The FRIB Project team remains committed to delivering FRIB for the user community, enabling forefront nuclear science on Day One. We also remain committed to delivering FRIB for the American taxpayers, who entrusted us with this project and all that it promises. The NSCL Operations staff is likewise dedicated to delivering reliable and forefront research opportunities to the user community. Overarching those commitments is our promise as a laboratory, honoring the courage of the survivors, to be brave enough to always do what is right to ensure that our students, faculty, staff, and user community are safe and supported here.

MSU remains committed to FRIB, as evidenced by its authorization for FRIB to proceed with two new additions to the facility ([see article below](#)).

Please do not hesitate to contact us if you have any questions or concerns during this time. We will continue to keep you apprised of developments.

Thank you for your continued commitment to and support of FRIB.

Sincerely,

Thomas Glasmacher
FRIB Laboratory Director and FRIB Project Director

Bradley Sherrill
NSCL Laboratory Director

TECHNICAL INSTALLATION PROGRESS

Technical installation progress continues to advance at FRIB, with the project meeting new milestones on a regular basis. This article highlights significant progress since what was featured in our last issue in January.

All FRIB cryomodules now in production with first three cooled in linac tunnel; successful second ARR held in May



FRIB continues technical construction, and another significant milestone has been reached with all cryomodules now in production. Cryomodules are key components of FRIB's superconducting linear accelerator (linac). As of the end of May, 22 of 46 have been installed in the linac tunnel.

FRIB continues technical construction, and another significant milestone has been reached with all cryomodules now in production. Additionally, the first three cryomodules in the linear accelerator tunnel have been successfully cooled down to 4 Kelvin, as part of FRIB's phased beam-commissioning plan. In late May, the second Accelerator Readiness Review (ARR02) was held, with the committee answering all charge questions affirmatively, contingent upon completion of pre-start recommendations. ARR02 provided independent input to the FRIB laboratory director and the MSU president for their authorization to operate the first three cryomodules ($\beta=0.041$) in linac segment 1 for commissioning with beam.

The linear accelerator consists of 46 cryomodules that will deliver the heavy ion beam to its target where rare isotopes will be produced. A total of 324 superconducting resonators assembled in the cryomodules will be cooled down with liquid helium to accelerate the beam. There are six different types of cryomodules and four different types of resonators, and each type is currently in production. As of the end of May, 22 cryomodules have been installed in the FRIB tunnel, and the rest will be finished and installed by end of 2019.

FRIB is on the leading edge of cryomodule manufacturing with its highly trained staff and advanced production facility. There are two horizontal cryomodule test facilities that are supported by an independent helium refrigeration system for the purpose of cold testing.

FRIB has also established a supply chain for the production of cryomodules that provides access to specialty technical components for cryomodules and other linear accelerator devices. FRIB trains cryogenic students in its state-of-the-art facilities to give them a unique experience and prepare them for jobs in the industry.

LBNL builds state-of-the-art magnet for FRIB accelerator



FRIB partnered with the Berkeley Center for Magnet Technology at the Lawrence Berkeley National Laboratory to design and build a state-of-the-art magnet.

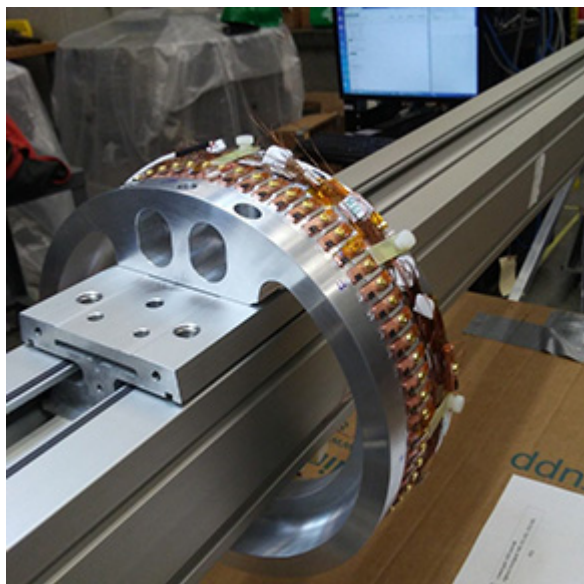
FRIB's heavy-ion beam will begin with a high-performance source of heavy ions, the electron cyclotron resonance (ECR) source. A key component of the ECR source is an advanced superconducting magnet.

FRIB partnered with [the Berkeley Center for Magnet Technology \(BCMT\)](#) at [the Lawrence Berkeley National Laboratory \(LBNL\)](#) to design and build the state-of-the-art magnet. The magnet arrived at FRIB on 12 December 2017.

"I am delighted that LBNL has built, successfully tested, and delivered the superconducting cold mass magnet for the FRIB ECR," said Thomas Glasmacher, FRIB Project director. "It has been a very good experience for us to work with the LBNL team on this magnet. I particularly appreciate the transparency with which the LBNL team has communicated with the FRIB team, and LBNL's commitment to a high-quality product that was delivered within cost."

For more information, [see the article on the LBNL website](#).

FRIB builds quadrupole field mapper system for separator magnets



FRIB has designed and built a field mapper for use on the large-bore quadrupole magnets of the fragment separator.

The FRIB magnet department and fragment separator group, together with NSCL physicists' support, have designed and built a field mapper for use on the large-bore quadrupole magnets of the fragment separator, which will remove contaminants from the beam and collect the desired isotopes for research. The mapper design is the first of its kind for the laboratory. It will be

The FRIB separator magnets will operate at high magnetic fields that saturate the return yokes; hence, it becomes difficult to accurately predict the magnetic field behavior using simulation models. Saturation effects weaken the magnetization of ferromagnetic materials, which in turn causes distortions in the field distribution. The availability of measured magnetic field maps is important for confirming the magnet's field quality, for its alignment, and for efficient fragment separator beam-tuning during operation.

The mapper consists of 72 Hall sensors that are evenly spaced in a circular pattern about a ring (see figure). A motorized linear slide system passes the ring through the bore as it acquires field data.

Each Hall sensor measures magnetic field at a select point and is accurately positioned in order to obtain good magnet alignment about the separator. The first design of its kind for the laboratory, past designs have relied on using a single probe that is rotated about the beam axis in order to measure the field about the circle. Such a scheme takes more time and makes it difficult to keep the probe along a circular orbit. The circle of fixed probes avoids such problems and also cuts down the amount of scanning time.

used to scan the magnetic field inside of each magnet to produce a map that can be used to describe its field in three dimensions.

DOE-SC Office of Project Assessment Review held 15-17 May



The DOE-SC Office of Project Assessment's (OPA) review of FRIB was held 15-17 May. Reviewers are pictured above.

The DOE-SC Office of Project Assessment's (OPA) review of FRIB was held 15-17 May. The main focus of the review was to assess overall FRIB Project progress since the last review in December 2017, with a focus on technical progress.

The review committee was organized into four subcommittees, and FRIB staff gave 50 presentations.

The OPA assessed all aspects of the FRIB Project – technical, cost, schedule, management, and environmental safety and health – and found that FRIB is making appropriate progress toward completion and is well-managed. The review committee answered all charge questions affirmatively.

DOE has tentatively scheduled the next FRIB Project progress review for 6-8 November 2018.

FRIB and NSCL open house set for 18 August

The public is invited to get behind the scenes at the [Facility for Rare Isotope Beams](#) and [National Superconducting Cyclotron Laboratory](#) (NSCL) during an open house scheduled for Saturday, 18 August. The event will run from 11 a.m. to 5 p.m., with last tours starting at 4 p.m. At the open house, attendees will have the opportunity to learn more about FRIB and NSCL, rare isotope research, and view FRIB project progress.

The open house is free and open to all ages, and no appointment is necessary to participate.

What you can do at the open house:

- View progress made in the establishment of FRIB.
- Tour some currently operational areas in NSCL that will be used in FRIB experiments.
- Explore the fields of FRIB and NSCL research with several hands-on activities and demonstrations.
- Meet nuclear scientists as they talk about their work on the frontiers of rare-isotope research.

Michigan State University (MSU) is committed to providing equal opportunity for participation in all programs, services, and activities. Accommodations for persons with disabilities may be requested in advance by contacting Alexa Allen at 517-908-7801 or events@frib.msu.edu by Friday, 17 August. Requests received after this date will be honored whenever possible.

Free parking will be available in both the [Wharton Center](#) and [Shaw Lane](#) parking ramps, and handicap parking will be available near the event entrances. Questions? Email events@frib.msu.edu.

MSU is establishing FRIB as a scientific 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.

Visit frib.msu.edu/openhouse2018 for the most up-to-date information as the event date approaches.

Alexandra Gade receives 2018 William J. Beal Outstanding Faculty Award



The shape, the excitation pattern, the energy and occupation of the nucleus' quantum mechanical orbits by protons and neutrons may be significantly altered compared to expectations based on the well-known properties of stable isotopes of the elements found in nature. Her research group performs scattering experiments to characterize the bulk effects of these changes by assessing the deformation of a nucleus and its excitation pattern. She uses beams of rare isotopes to induce particular nuclear reactions in which parts of the nucleus are knocked out or added to a rare isotope, which then allows her to track the exciting modifications of nuclear structure on the level of the neutron and proton quantum mechanical orbits that make up the nucleus on a microscopic level.

Gade has published more than 200 articles in

Alexandra Gade

Alexandra Gade, professor of physics and [National Superconducting Cyclotron Laboratory \(NSCL\)](#) chief scientist, received the 2018 William J. Beal Outstanding Faculty Award from [Michigan State University \(MSU\)](#).

Administered by the All-University Awards Committee, the annual Beal awards recognize members of MSU's regular faculty for outstanding service to the university. Recipients are nominated by their college/unit, and the awards committee makes the final selection.

"I am very honored to receive this recognition from MSU," said Gade. "Being part of NSCL/FRIB (the Facility for Rare Isotope Beams) and the [Department of Physics and Astronomy](#) has allowed me to pursue exciting nuclear science research and work with excellent students and research associates on new discoveries in the field."

"Alexandra is truly deserving of this award," said FRIB Laboratory Director Thomas Glasmacher. "It is a recognition of the knowledge and skill she brings to the FRIB Laboratory. Her work, including her research and leadership, is a tremendous example for all of us."

Here is her nomination announcement:

Since joining MSU in 2004, Alexandra Gade has distinguished herself as one of the leading experimental scientists in nuclear physics. Her research interests are in the study of the structure of the atomic nucleus at the extremes of neutron-proton asymmetry. Short-lived, rare isotopes composed of many more neutrons than protons, for example, often reveal surprising properties.

referenced journals and given more than 60 invited talks at conferences and workshops and more than 20 invited seminars and colloquia. She is an excellent mentor and adviser, having supervised 15 undergraduate students, graduated six PhD students, and mentored nine postdoctoral fellows. Three PhDs and two postdoctoral fellows currently work in her group.

Gade's work includes significant service to the nuclear science community. She has been a member of the top advisory committee to the U.S. government on nuclear science research, the [Nuclear Science Advisory Committee of the Department of Energy](#), and the [National Science Foundation](#). As the NSCL's Chief Scientist, Gade has played a major role in assembling white papers on rare isotope research and defining critical instrumentation needed in the FRIB era. She has served on national and international committees, including the Nuclear Science Advisory Committee, committees of the [American Physical Society](#) and program advisory committees of ATLAS at [Argonne National Laboratory](#), [GANIL](#) (France) and [GSI/FAIR](#) (Germany).

Gade's leadership has been recognized with several prestigious national and international awards, including the Szymański Prize (2015), the DOE Outstanding Junior Investigator award (2008), the Alfred Sloan fellowship (2008) and American Physical Society fellowship (2013).

For her significant accomplishments as a scholar, teacher, mentor and leader, Alexandra Gade is highly deserving of the Michigan State University William J. Beal Outstanding Faculty Award.

Melissa Congleton receives MSU's Ruth Jameyson 'Above and Beyond' Award

"I am pleased to be recognized with this award and to represent the Facility for Rare Isotope Beams and MSU Police in a positive way," said Congleton.

Throughout her career as an officer with the MSU police department, Congleton earned the designation of professional emergency manager through the



FRIB Homeland Security Officer Melissa Congleton received the Ruth Jameyson "Above and Beyond" Award from MSU.

FRIB Homeland Security Officer Melissa Congleton has received the Ruth Jameyson "Above and Beyond" Award from MSU. This award recognizes support staff members who are pursuing a post-baccalaureate degree while also performing "above and beyond" in the scope of their duties at MSU.

Congleton has served as an officer with the MSU police department for the past 19 years. She is currently assigned to FRIB as the Homeland Security Officer. Her work with FRIB ensures the world-class facility can conduct its research in a safe and secure environment.

Michigan State Police. Through this designation, Congleton led a group to have MSU be the first university in Michigan and the Big Ten to obtain accreditation from the Emergency Management Accreditation Program. Earlier in her career, Congleton supervised the Greencoat Security program. There, she developed a recognition system, enacted a discipline system and revamped the training program.

Congleton is currently working to earn her masters of divinity degree at the Ecumenical Theological Seminary in Detroit. In order to accomplish this, Congleton drives to Detroit to attend night classes after working a full day at MSU. She currently holds a 4.0 in the program and plans to serve as a priest in the Episcopal Church upon degree completion.

Congleton's body of work exemplifies MSU's mission of advancing knowledge and transforming lives. Her commitment to MSU is evident in all aspects of her distinguished career and dedication to her studies.

"Melissa has accomplished much during her career and is a role model for us at FRIB. We are honored she is assigned to our laboratory," said FRIB Laboratory Director Thomas Glasmacher.

Congleton was presented with the award at a special ceremony on 21 May.

FRIB's Amy McCausey receives Greater Lansing Community Champion Award

Amy is responsible for planning FRIB events and conferences, which host national and international colleagues and visitors. "It is nice to have that

This video features Amy McCausey discussing her award.

FRIB Accelerator Systems Division Support Team Leader Amy McCausey has been named a Greater Lansing Convention and Visitors Bureau (CVB) Community Champion. Amy was presented with the honor at a special ceremony held on 22 February.

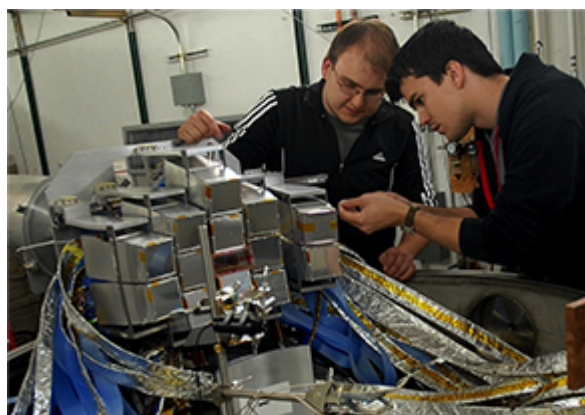
This award recognizes local individuals and organizations with a sense of civic pride and a desire to showcase their hometown. They assist the Greater Lansing Convention and Visitors Bureau in securing meetings, conventions, sports tournaments, and other events in the Greater Lansing region.

hometown feel when they come to our events,” said Amy. A native of the Greater Lansing community, she states that “it is always important to me to support the local businesses and keep our economy thriving.”

“It is an honor to have been named a Greater Lansing CVB Community Champion. It reinforces to me that the community values the people who work hard to make it a great venue choice for any event,” said Amy.

More information about the award and other recipients can be found [here](#).

Kyle Brown wins the 2017 Dissertation Award in Nuclear Physics



Kyle Brown (left) works with graduate student Juan Manfredi (right), on the setup of the High Resolution Array for Kyle's thesis experiment. Kyle won the 2017 Dissertation Award in Nuclear Physics.

The [2017 Dissertation Award in Nuclear Physics](#) was awarded to Kyle Brown of Washington University at St. Louis for his “For elucidating the continuum structure of light proton-rich nuclides using invariant mass spectroscopy” dissertation.

His thesis experiments were done at MSU using the

Other interesting studies in his dissertation include the first data on ^{17}Na , a complete reanalysis of the $A = 7$, $T = 3/2$ isobars, and studies of the one- and two-proton decaying states in ^8B , ^9B , ^9C , ^{16}F , ^{16}Ne and ^{17}Ne . Kyle's dissertation was characterized by excellent experimental work that was matched with insightful analyses.

Since completing his dissertation, Kyle accepted a Hansen Postdoctoral Research Fellowship at the NSCL, where he is currently running an experimental campaign probing the isospin dependence of nucleon effective masses. Kyle received his B.S. in chemistry in 2012 from Indiana University, and was awarded the Charles D. Coryell Award in Nuclear Chemistry from the American Chemical Society for his undergraduate thesis entitled “N/Z composition of fragments produced in binary decay of projectile-like fragments.” He attended Washington University in St. Louis for his graduate studies in nuclear chemistry. As a graduate student he received the GAANN Fellowship in 2013, and in 2014 was awarded with the Graduate Research Fellowship from the National Science Foundation.

High Resolution Array (HiRA). In his dissertation, Kyle studied the continuum structure of light nuclei using the invariant-mass technique. Of the many interesting aspects of his dissertation, one highlight is a 3-particle + 1 gamma coincidence experiment in which he proved that the dominant decay of the isobaric analog state in ^8B is the prompt 2-proton emission to the isobaric analog state in ^6Li .

Annual Nuclear Physics DC Day held 9 April



The participants at the seventh annual Nuclear Physics DC Day are briefed at a breakfast gathering prior to the congressional meetings.

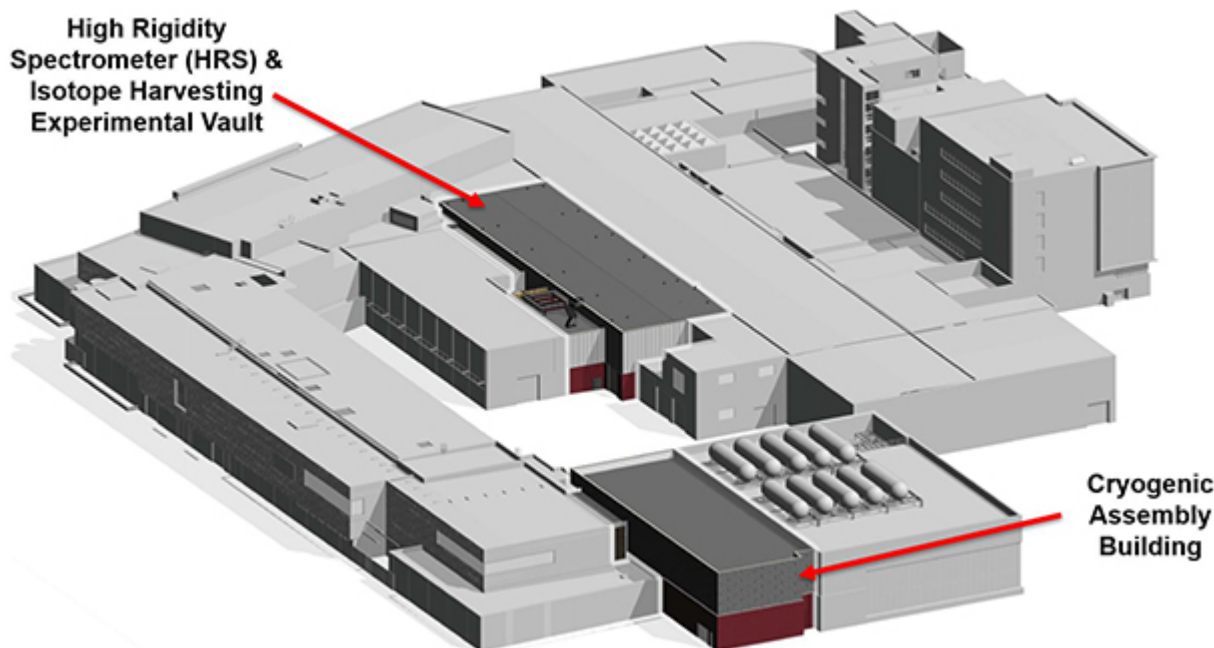
The seventh annual “Nuclear Physics DC Day” occurred on 9 April. This year’s event, where members of the nuclear science community get the chance to visit with members of their congressional delegations and discuss the importance of nuclear science, was the best attended yet for what has become an annual tradition. Over 100 (102 to be exact) nuclear physicists from 33 different states participated with about 40 from the low-energy nuclear physics community. They met with staffers from 110 different House and Senate offices.

The community’s specific asks for FY19 were:

- Support for continued strong funding for the U.S. Department of Energy (DOE) Office of Science in FY19, consistent with the spending caps enacted in the Bipartisan Budget Act (\$6.6 billion).
- Support for “modest growth” of the DOE Nuclear Physics program consistent with the recommendations of the 2015 DOE/National Science Foundation (NSF) Nuclear Science Advisory Committee Long Range Plan (\$715 million in FY19).
- Support continued increases for the NSF to realize cutting-edge opportunities and support facilities and single investigators (\$8.45 billion in FY19).

The feedback from the meetings was very positive, and the staffers were in general very supportive of basic science research. Such meetings are essential as they show Congress the direct impact that funding for basic science has on researchers and students from their states and districts.

MSU Board of Trustees authorizes FRIB to proceed with two additions; construction is underway



On 16 February, the MSU Board of Trustees authorized FRIB to proceed with two new additions to the facility, and construction of the additions is currently underway.

On 16 February, the MSU Board of Trustees authorized FRIB to proceed with two new additions to the facility that will expand FRIB's discovery potential and enable isotope harvesting.

- A 31,000-square-foot High Rigidity Spectrometer HRS and Isotope Harvesting Vault to house research equipment for isotope harvesting and to provide experimental space for the FRIB science program. It is scheduled to be completed in August 2019. Read more about isotope harvesting opportunities at FRIB in [the story below](#).
- A 14,000-square-foot Cryogenic Assembly Building adjacent to the existing Superconducting Radio Frequency Highbay for the maintenance of cryomodules and to perform research pertaining to cryogenic engineering. It is also scheduled to be completed in August 2019. The current cryomodule assembly space in the east highbay will become research space for the reaccelerated beam program when the FRIB cryomodule production completes in 2019.

The board's planning approval means FRIB has a defined scope, schedule, and project budget for the additions. Having received the board's approval, underground utilities have been rerouted under the building footprint for the new CAB addition. Drilled piers (caissons) have also been completed, with foundation work starting in July 2018. In preparation for the HRS addition, demo of existing buildings has started and will continue throughout June.

Isotope harvesting white paper released

This concept is termed "isotope harvesting," and after a series of biennial workshops, the group of interested researchers coalesced the scientific goals of isotope harvesting into a white paper titled "[Isotope Harvesting at FRIB: Additional opportunities for scientific discovery](#)."



Since the conception of the FRIB Project, a subset of the nuclear-science community has focused on the new radiochemistry that FRIB will enable. Their interest is rooted in the opportunity to access unused by-product radioisotopes from FRIB as a background operation while the facility is delivering exotic nuclei to other experiments.

The white paper highlights many of the research projects that the wide selection of isotopes that FRIB can facilitate. Some examples include harvesting isotopes for plant and soil sciences, medicine, stewardship science, radio-thermal generators, and many others. The projects are diverse in their applications and goals. The white paper also gives an outline for how to implement the harvesting idea at FRIB, by tapping into the beam-dump cooling and off-gas streams and chemically extracting the induced radio isotopes. As FRIB comes online, its isotope harvesting has the opportunity to broaden the impact of FRIB to fields well beyond nuclear physics.

The white paper is posted [online](#), and hard copies are available by emailing Greg Severin at severin@frib.msu.edu.

FRIB research well represented at Stewardship Science Academic Programs Symposium

The National Nuclear Security Administration (NNSA) of the U.S. Department of Energy sponsors the Stewardship Science Academic Programs (SSAP) as a means to ensure that expertise is maintained in scientific and engineering disciplines critical to the long-term viability of the nation's nuclear stockpile in the absence of explosive testing. A two-day symposium highlighting the accomplishments of the SSAP was held in Bethesda, Maryland, on 21-22 February.

One of the major research programs under SSAP is the Stewardship Science Academic Alliances, which supports basic science research in properties of materials under extreme conditions, low-energy nuclear science, and radiochemistry. A number of FRIB users have received grants under this program, and they actively participated in the symposium. Oral presentations were given by 13 FRIB users from eight different academic institutions, covering research progress related to neutron capture, fission, and novel instrumentation. Poster presentations were also made by participating students and post-docs, with 35 of the posters made by young scientists engaged in FRIB-related science.

The NNSA publishes an annual report on SSAP activities, and the 2018 Annual Report highlights the FRIB-related research work of Professor Robert Grzywacz (University of Tennessee) and Professor William Lynch (Michigan State University). Student profiles of Rebecca Lewis (Michigan State University, advisor Professor Sean Liddick) and Zachary

Matheson (Michigan State University, advisor Professor Witold Nazarewicz) are also included in the report. The SSAP annual reports are available [online](#).

FRIB hosts soprano, piano recital as Advanced Studies Gateway event



FRIB hosted a soprano and piano recital at the laboratory on 25 May. The recital featured soprano Lia Naviliat-Cuncic (right) and pianist Manuel Vieillard (left).

FRIB hosted a soprano and piano recital at the laboratory on 25 May, featuring soprano Lia Naviliat-Cuncic and pianist Manuel Vieillard. More information about the performance can be found on the [concert web page](#). Approximately 70 attendees came to the event.

The recital was part of the Advanced Studies Gateway at FRIB that features research workshops as well as public talks, concerts, and other events that are free and open to the public. The program brings together researchers, innovators, creative thinkers, artists and performers from all fields and strengthens ties between Michigan State University and the larger science community.

"Bravo to our talented performers Lia and Manuel for a wonderful concert," said Dean Lee, FRIB Professor of Physics. "We hope this will be an auspicious start to the Advanced Studies Gateway concerts."

A video of the recital is now [online](#).

For more information about the Advanced Studies Gateway at FRIB, visit frib.msu.edu/gateway.

MSU composer receives prize for 'Cyclotron'



Music composer David Biedenbender from the MSU Music Department won the 138th annual American Society of Composers, Authors and Publishers (ASCAP) Foundation Rudolf Nissim Prize for his work titled 'Cyclotron.'

In "Cyclotron," the music develops out of a small collection of motifs and gestures, which are layered and transformed over time to try to portray things like time dilation (accelerated particles experience slower time) through acceleration/deceleration and expansion/contraction, particle versus wave-like motion, cyclical and spiraling motion, the Doppler effect to convey speed and direction, and mechanical, machine-like sounds.

"It is my hope that, in some small way, this music captures the strange and mysterious beauty of the sub-atomic world and that it honors the work and research of the scientists at MSU and their extraordinary machine," said Biedenbender.

Music composer David Biedenbender from the MSU Music Department won the 138th annual [American Society of Composers, Authors and Publishers \(ASCAP\) Foundation](#) Rudolf Nissim Prize for his work titled “Cyclotron.” The 10-minute work is for wind and percussion instruments, and Biedenbender’s piece was selected from 140 entries by a panel of conductors.

“Cyclotron” was commissioned by the Michigan State University Wind Symphony and Kevin Sedatole, the director of bands, and professor of music and chair of the conducting area at Michigan State University, and premiered at the College Band Directors National Association Conference in Kansas City, Missouri, in March 2017.

“In this piece I use the cyclotron as a launching point for my creative process,” said Biedenbender. “I imagined a fictional and playful sonification of the cyclotron and of what happens to particles when they are smashed together at nearly half the speed of light. These violent nuclear collisions tend to cause strange things to happen, and, among other things, at MSU’s cyclotron, the experimental observations of these collisions have led to the discovery of completely new types of nuclei (isotopes). In fact, the infinitesimally small particles that make up atoms generally behave in bizarre—though not totally unexpected—ways (thanks to quantum physics) when compared to our understanding of the visible world. Among many peculiar subatomic phenomena, light particles called photons can behave both like particles and waves and particles can simultaneously be in two different places at once!”

The Rudolf Nissim Prize is “presented annual to an ASCAP concert composer for a work requiring a conductor that has not been performed professionally,” according to the ASCAP Foundation website.

The ASCAP Foundation is a charitable organization dedicated to supporting American music creators and encouraging their development through music education and talent development programs. Such programs include songwriting workshops, grants, scholarships, awards, recognition and community outreach programs, and public service projects.

“Cyclotron” can be found online in the following locations:

- [YouTube](#)
- [Sound Cloud](#)
- [DavidBiedenbender.com](#)

Alumni spotlight: Njema Frazier

Reflecting on her time at NSCL and how it influenced her career path, Njema said, “I really enjoyed the process of becoming a honed expert in my field, and I knew I wanted to stay connected to the scientific community.” However, she also had a number of interests beyond research. She was active in multiple civic and outreach organizations – at one point serving as the Afterschool Coordinator at the Black Child & Family Institute in Lansing, Michigan, while concurrently working on her doctorate.



Njema Frazier

Njema Frazier earned her PhD in theoretical nuclear physics from Michigan State University in 1997 under the mentorship of Alex Brown. During her time at NSCL from 1994 to 1997, she focused on theoretical nuclear structure, using the Shell Model to calculate transitions from excited states of sd-shell nuclei.

For the past twenty-one years, Njema has worked in the federal government. First, in the legislative branch as a congressional staff member, and then in the executive branch as a program manager and program director for the Department of Energy, National Nuclear Security Administration (NNSA). She was one of the technical experts in the federal government responsible for the management and oversight of the nation's capability to maintain the nuclear deterrent without underground nuclear explosive tests. She led nuclear weapons stockpile stewardship related efforts in scientific theory, modeling and simulation, and experimentation.

Njema most recently served as the lead for inertial confinement fusion (ICF) and high energy density (HED) science at NNSA. She oversaw a \$550 million portfolio of scientific activities in HED and ICF at the NNSA National Defense Laboratories – Lawrence Livermore, Los Alamos, and Sandia national laboratories – as well as at the Laboratory for Laser Energetics at the University of Rochester. These primarily included the experiments conducted at the National Ignition Facility, the Z Pulsed Power Facility, and the Omega Laser.

“As a black woman in physics, I was keenly aware of the systemic underrepresentation of women and people of color in science, technology, engineering, and mathematics and did what I could to promote science in K-12,” she said. Her varied interests in physics, policy, and education led her to pursue a career in Science Policy. After obtaining her PhD, she accepted a position as a Professional Staff Member for the U.S. House of Representatives Committee on Science, launching her career in the federal government.

The valuable life lessons Njema learned at NSCL still stand out more than twenty years after her departure from East Lansing. These life lessons have held her in good stead throughout her professional career. “First, find a good advisor with whom you work well. I got extremely lucky with Alex Brown!” she said. “Second, take the time to get to know people as individuals, build relationships, and find common ground. Third, nurture your interests inside and outside of science; these are all part of what makes you you. You never know when your unique blend of knowledge, skills, and interests will make the difference.”

Njema has been accepting speaking engagements to promote STEM heavily since 2013 when she began to be featured regularly online, in print, and in televised broadcasts. These include: Diverse Faces of Science, the Griot's List of 100 History Makers in the Making, the Black Enterprise Hot List, the Essence Power List, the EBONY Power 100 List, and most recently, the Black Girls Rock! Awards, where she was honored as the STEM Tech Recipient for 2017.

Starting off a busy 2018 of speaking engagements, she gave an American Physical Society (APS) Plenary Talk in April, and was the commencement speaker at Carnegie Mellon University for the PhD Hooding Ceremony in May. What is next for Njema? She will be a plenary speaker at the forty-fifth International Conference on Plasma Science (ICOPS) later in June. And finally, congratulations are in order for Njema, who is engaged to be married in August.

As of June 11, however, Njema started a new Senior Executive Service position with DOE/NNSA as the Director of the Office of Experimental Sciences.

SUMMER SCHOOLS STIMULATE SCIENCE STUDY

A number of summer schools are taking place in 2018 to allow students and young researchers the opportunity to explore the world of science.

U.S. Particle Accelerator School: Summer 2018 session held 4-15 June at MSU



Students in the 2018 U.S. Particle Accelerator School (USPAS) held at Michigan State University work together on a project. One-hundred thirty-three students from around the world attended the intensive two-week session at MSU. Photo credit: Irina Novitski, USPAS

Michigan State University (MSU) hosted the summer 2018 session of the U.S. Particle Accelerator School (USPAS), a national graduate-level training and workforce development program in accelerator science and engineering funded by the Office of High Energy Physics in the U.S. Department of Energy Office of Science (DOE-SC).

Particle accelerators are used in discovery science, medicine, and high-tech industry. USPAS trains graduate students as well as scientists and engineers in rigorous courses that are designed to support the needs of the field.

This intensive two-week session of USPAS was held at the Kellogg Center and Conference Center on MSU's campus. Nine courses were offered at the MSU session and 133 students from all over the world were in attendance. This was the third time that MSU has hosted the USPAS. Of the twenty-two instructors

Under construction on the MSU campus is FRIB, a future DOE-SC scientific user facility, supporting the mission of the Nuclear Physics Office in DOE-SC. At the heart of FRIB is the most powerful, superconducting linear accelerator that will accelerate heavy ions to about half the speed of light. FRIB will enable scientists to make discoveries about the properties of rare isotopes, supporting a community of currently 1,400 scientists.

Having available and training a workforce in accelerator science and engineering is an important part of FRIB.

FRIB provides hands-on opportunity to train the next-generation accelerator science and engineering workers on a world-class accelerator. In collaboration with the College of Natural Science and the College of Engineering, FRIB attracts the best and brightest students into accelerator science and engineering.

FRIB Professor of Physics Steve Lund is the director of the USPAS. "MSU has been a superb host of USPAS. Courses are being held in unique facilities on campus and the departments have sent many talented students and have provided a high level of instructor and grader support," Lund said.

USPAS sessions are held every year in June and January. USPAS students come from all a broad range of educational and practical experience. The courses are aimed toward upper-level undergraduates and graduate students. The students are highly selected and motivated. They are from laboratories, private companies, government, or the military. Some come from abroad. Some of the students have been working in the accelerator field and are expanding

teaching at this summer's school, nine were from MSU. The MSU instructors are experts in accelerator physics, ion source physics, and cryogenic engineering. They are affiliated with FRIB, the National Superconducting Cyclotron Laboratory, the MSU Department of Physics and Astronomy, and the MSU Department of Mechanical Engineering.

USPAS has offered graduate-level accelerator science and engineering courses in an intensive-school format since 1981. USPAS courses and documentation have been recognized for excellence and the school has had a positive impact on the field. The school is intended not only to meet the needs of national laboratories, but to educate people to develop particle accelerators for use in other fields, including industrial and medical applications. The USPAS offers a continually updated curriculum of courses ranging from fundamentals of accelerator science to advanced physics and engineering concepts.

their skills to support and extend the latest technology as the field evolves.

The USPAS collaboration includes Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, SLAC National Accelerator Laboratory and Thomas Jefferson National Accelerator Facility, all U.S. DOE Office of Science labs; Los Alamos National Laboratory, a U.S. DOE National Nuclear Security Agency lab; Cornell University and Michigan State University.

NS3 Nuclear Science Summer School held 13-19 May at MSU



The National Superconducting Cyclotron Laboratory hosted the 2018 Nuclear Science Summer School (NS3) from 13-19 May. This is the third year for the annual educational event.

[The National Superconducting Cyclotron Laboratory \(NSCL\)](#) hosted the [2018 Nuclear Science Summer School \(NS3\)](#) from 13-19 May. This is the third year for the annual educational event. Involvement in NS3 is funded by the [National Science Foundation](#) CAREER grant, NSCL, and the [Joint Institute for Nuclear Astrophysics – Center for the Evolution of the Elements](#), and all of the students were fully supported for their participation.

At NS3, fifteen undergraduate students from eleven universities spent a full week at NSCL learning about nuclear science. Participants interacted with twenty lecturers and ten graduate students. The students had the opportunity to attend lectures from experts in the field, participate in hands-on activities, interact with graduate students, postdocs and faculty, and take a tour of NSCL and FRIB.

“The best thing about the school is to see the students’ transformation from curious but uncertain to excited and confident within a week,” said Associate Professor of Physics and NSCL Associate Director for Education and Outreach Artemis Spyrou. “Most students come from small physics departments around the country and it’s their first time interacting with such a large group of other interested students and researchers. And for us it is simply a joy to share our favorite nuclear physics topics with a group of enthusiastic young physicists.”

FRIB Theory Alliance summer school held 16-18 May at MSU

This summer school was designed to allow a broader audience to better appreciate the developments



Lecturer Luke Roberts (right) talks to attendees of the FRIB Theory Alliance summer school.

The FRIB Theory Alliance summer school [“Neutron star mergers for non-experts: GW170817 in the multi-messenger astronomy and FRIB eras”](#) was held 16-18 May at MSU, focused on the scientific discoveries resulting from the recent observation of a neutron-star merger.

Hosted by the [FRIB Theory Alliance](#), a coalition of scientists from universities and national laboratories, this summer school had more than 80 attendees from around the world as well as over twenty online participants. Attendance was more than twice the originally expected number.

The observation of the GW170817 merger provides additional information for nuclear astrophysics, and it signals a new era in multi-messenger astronomy.

resulting from the observation of the merger. Lecturers at the summer school are from Columbia University, Indiana University, Princeton University, the Canadian Institute for Theoretical Astrophysics, Joint Institute for Nuclear Astrophysics – Center for the Evolution of the Elements (JINA-CEE), and Michigan State University.

“This is a crash course covering the wide range of physics relevant to understanding neutron star mergers, and gravitational wave event GW170817 in particular. This will help to give the students the tools they need to connect the science of FRIB to gravitational wave observations and in the future contribute to our understanding of the properties of neutron stars and the origin of the heavy elements in our galaxy,” said Luke Roberts, a lecturer at the school.

FRIB Theory Alliance Managing Director Filomena Nunes said that “there was a tremendous and worldwide response when we sent out the announcement of the school, from truly passionate people who are now here learning more and sharing their excitement.”

The school was organized by the [FRIB Theory Alliance](#). For more information, read the full [article on the FRIB website](#).

FRIB in the news

The Lansing State Journal published an opinion column about government funding of education, including the funding of FRIB.

- [Viewpoint: Education is the best investment in Michigan's future](#)

MSU Today published an article about MSU employees receiving university awards, including Melissa Congleton, FRIB's homeland security officer.

- [MSU employees to receive Jack Breslin Award May 21](#)

MSU Today published an article about the MSU Board of Trustees approving FRIB to proceed with the construction of its two new additions.

- [MSU board approves personnel changes, health care strategy, next phase of FRIB](#)

FRIB science and scientists in the news

MSU Today published an article about FRIB's Witek Nazarewicz, who is part of an international team of researchers unlocking the mysteries of the atomic nuclei.

- [Is there an end to the periodic table?](#)

MSU Today published an article about a summer school hosted by FRIB that focused on the recent observation of a neutron-star merger.

- [FRIB hosts summer school on neutron-star merger](#)

MSU Today published an article about four MSU students who were nominated for national STEM scholarships. NSCL Research Assistant Gabriel Moreau is among the nominees.

- [Four students nominated for national STEM scholarship](#)

MSU Today published an article about 10 of MSU's graduate programs being ranked by the U.S. News & World Report as being in the top 10 nationally.

- [10 MSU graduate programs in the top 10 nationally](#)



Please update your information via the alumni directory form

In an effort to improve the communication with FRIB Laboratory alumni and to better track their career paths, the laboratory has created a new [alumni directory form](#).

Please take a couple of minutes to fill out this new form by answering a few simple questions. Going forward, the lab will ask you to update your information once a year, to ensure our records are accurate. Visit the online [alumni directory form](#) to enter and update information.



We want to hear from you

Send us your story ideas! Let us know what you are up to!

We want to feature at least one story each issue about you—our FRIB/NSCL alumni, so please email us story tips about you and/or your fellow alumni to alumni@frib.msu.edu. Tell us about discoveries, business ventures, partnerships, awards, and other professional developments, and we may feature them in a future issue. Also let us know if there are other types of laboratory updates you'd like to see in future alumni issues.



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LOOKING AHEAD

- 5-10 August** [Nuclear Structure 2018 Conference](#) in East Lansing, Michigan
- 7-8 August** National Science Foundation site visit of NSCL
- 10-11 August** [Low Energy Community Meeting](#) at FRIB/NSCL in East Lansing, Michigan
- 18 August** [FRIB Open House](#)
- 2-4 October** Accelerator System Advisory Committee Review (tentative) of FRIB

The FRIB Laboratory Update for Alumni is published by the FRIB Laboratory and distributed via email. Please e-mail questions, comments, address changes, story tips, contributions, or requests to unsubscribe from this list to alumni@frib.msu.edu. If you are in touch with other NSCL/FRIB alumni, please forward this to them and invite them to contact us to subscribe.



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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](#).