FRIB LABORATORY UPDATE for USERS December 2017

FRIB Project in fourth quarter; eye on future mission of enabling discoveries as civil, technical construction integrate

by Thomas Glasmacher, FRIB Laboratory Director

We are now in the last quarter of our 13-year Facility for Rare Isotope Beams (FRIB) Project. We are currently 81-percent complete overall with many achievements over the past year. In March we marked beneficial occupancy of civil construction, and we had the first of nine planned Accelerator Readiness Reviews in July. In September, we accelerated via the radio frequency quadrupole an argon beam to an energy of 500 kiloelectron-volt/nucleon through the Medium Energy Beam Transport (MEBT) line, and followed in October with a test beam of krypton accelerated by the RFQ to the end of the MEBT to the same energy.

In November, the FRIB cryogenic plant made its first liquid helium at 4.5 K. Technical construction is 78-percent complete, and we are making good progress on demonstrating key performance parameters. As we enter the homestretch, we're not only focused on successfully integrating civil and technical construction but we're also thinking beyond the project to the mission of FRIB—enabling scientists to make discoveries.

The U.S. Department of Energy Office of Science (DOE-SC) Office of Project Assessment completed its most recent review of FRIB 5-7 December and found that the project is progressing appropriately per the established baseline.

At the review closeout session, DOE-SC Office of Nuclear Physics Facilities and Project Management Division Director Jehanne Gillo commended the FRIB Project team on the project's progress and emphasized the DOE-SC's support of FRIB. "FRIB is a high priority for the Office of Nuclear Physics, and even under these uncertain times and financial challenges we are committed to doing our very best within given constraints to provide FRIB with support it needs," she said. "So that is something you can count on from us."

We will continue to consider the remaining work to be our last 100 percent and will maintain the focus and attention to detail that has gotten us to this point. We also continue to adopt the mantra DOE-SC OPA Review Committee Chairperson Kurt Fisher heralded at the conclusion of this month's review: "Just say 'no' to complacency."

Thank you for your work and support in 2017, and for your excitement about science at FRIB. We will continue to achieve technical milestones as we march to the finish of the FRIB Project. At the same time we are focusing our energy on the things that will affect future FRIB availability and users doing successful experiments – our commitment to the worldwide science community and return on investment to the American people.

FRIB users Kelly Chipps and Heiko Hergert awarded U.S. Department of Energy awards

Kelly Chipps
(Photo courtesy of Oak Ridge National Laboratory/U.S. Department of Energy)

Two scientists who perform research at FRIB and NSCL have received DOE-SC Early Career Research Program awards.

The program, in its eighth year, awards financial support to scientists from universities and DOE national labs to help advance their research. Research proposals are peer-reviewed and selected by one of the following six offices: Advanced Scientific Computing, Biological and Environmental Research, Basic Energy Sciences, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics. Out of about 700 proposals, fifty-nine were selected for the 2017 fiscal year.

FRIB user Kelly Chipps, a Liane B. Russell Fellow working in the Oak Ridge National Laboratory (ORNL) Physics Division, will receive funding for her proposal, "Next-Generation Particle Spectroscopy at FRIB: A Gas Jet Target for Solenoidal Spectrometers," selected by the Office of Nuclear Physics.

Kelly is the leader of the Jet Experiments in Nuclear Structure and Astrophysics (JENSA) collaboration at FRIB. The collaboration developed and installed a pure, recirculating gas jet target system on a dedicated beamline at the National Superconducting Cyclotron Laboratory (NSCL) in anticipation of reaccelerated beams from NSCL and, in the future, FRIB. Her research seeks to study exotic, unstable nuclei and nuclear reactions that power the stars by combining the benefits of the sophisticated state-of-the-art solenoidal spectrometer at Argonne National Laboratory and the JENSA system developed at ORNL. The project promises to resolve challenges to achieving high-resolution and low-background particle spectroscopy when applied to FRIB. The Early Career

"I'm excited because the Early Career Research award allows me to pursue the combination of two techniques," said Kelly. With the award, she will be able to build a prototype with the Helical Orbit Spectrometer (HELIOS) at Argonne National Laboratory.

Check out the video ORNL produced about Kelly's research.

Heiko Hergert, an MSU assistant professor of physics with a joint appointment in NSCL and FRIB, was also selected by the Office of Nuclear Physics for his proposal, "Advanced Ab Initio Methods for Nuclear Structure." Heiko's research focuses on using novel theoretical methods and large-scale computer simulations to model nuclei based on the fundamental interactions between the protons and neutrons they are made of.

"The exotic nuclei that FRIB will be able to produce are excellent laboratories for teasing out the fine details of these fundamental interactions," said Heiko. "By confronting our calculations with new experimental data, we will be able to close important gaps in our understanding." Reliable simulations of such nuclei require theoretical and computational advances whose development are a central goal of his Early Career Research proposal.

Heiko said he is honored to be a recipient of this highly competitive award.

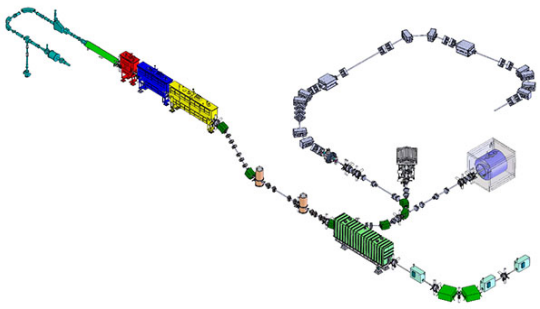
Heiko earned both his master's degree and PhD from Technische Universität Darmstadt in Germany. In 2009, he began his postdoctoral research at NSCL before transitioning to Ohio State University to continue his postdoctoral research. From 2014 to 2015, he worked as a theory fellow at NSCL/FRIB and in 2015 he became an assistant professor of physics.

Congratulations to Kelly and Heiko on receiving Early Career Research awards!

Research award will help her determine if the gas jet target system can work with a solenoidal spectrometer. This would allow researchers to understand the limitations in charged-particle spectroscopy.

Heiko Hergert

ReA6 gets green light from the National Science Foundation



ReA6 cryomodule shown in green with one beamline constructed from existing components except one new superconducting quadrupole doublet. Also shown is the ReA3 accelerator and separate ReA3 experimental hall, which contains SECAR, AT-TPC, and a general-purpose beam line. The ReA6 hall could be expanded to include two beamlines with additional funds.

The National Science Foundation (NSF) has agreed to a change of scope in the NSCL Cooperative Agreement to include implementation of a ReA6 capability for the user community. This decision paves the way for the NSCL to have 6 to 12 MeV/u reaccelerated beams (depending on A/Q) by sometime in 2020.

NSCL has remained at the forefront of nuclear science by responding to user requests for unique research capabilities. The scientific community has strongly expressed the desire for reaccelerated beams above the Coulomb barrier. In fact, the desire for reaccelerated beams at more than 10 MeV/u has long been a dream for the low-energy community. This was most recently summarized in the ReA Upgrade White Paper.

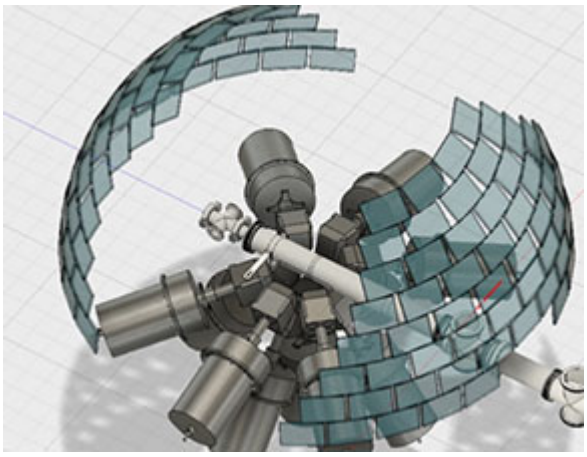
The proposed ReA6 capability was recommended by users at the conclusion of the 2016 Low Energy Community: “The user community strongly endorsesthe energy upgrade of ReA3 to ReA6 prior to FRIB as it offers tremendous opportunities for forefront science already at NSCL.”

The higher energy beams from ReA6 will open a wide range of new experiments to probe the collective and single-particle nature of rare isotopes. With the green light, a minimal ReA6 capability will be implemented by using an existing β=0.085 superconducting cryomodule, cryo-distribution system, and spare superconducting magnets (two dipoles and two quadrupole doublets). One beam line and a shielded experimental vault would be constructed to allow a fully functional user program.

A schematic layout of the minimum ReA6 system is shown in Figure 1, along with the existing ReA3 accelerator and experimental hall on the right. The primary experimental instrument is expected to be the SOLARIS solenoid spectrometer, which is under development at Argonne National Laboratory. Other devices could be mounted in the hall as well.

FRIB Decay Station whitepaper workshop set for 24-25 January

by Robert Grzywacz, University of Tennessee



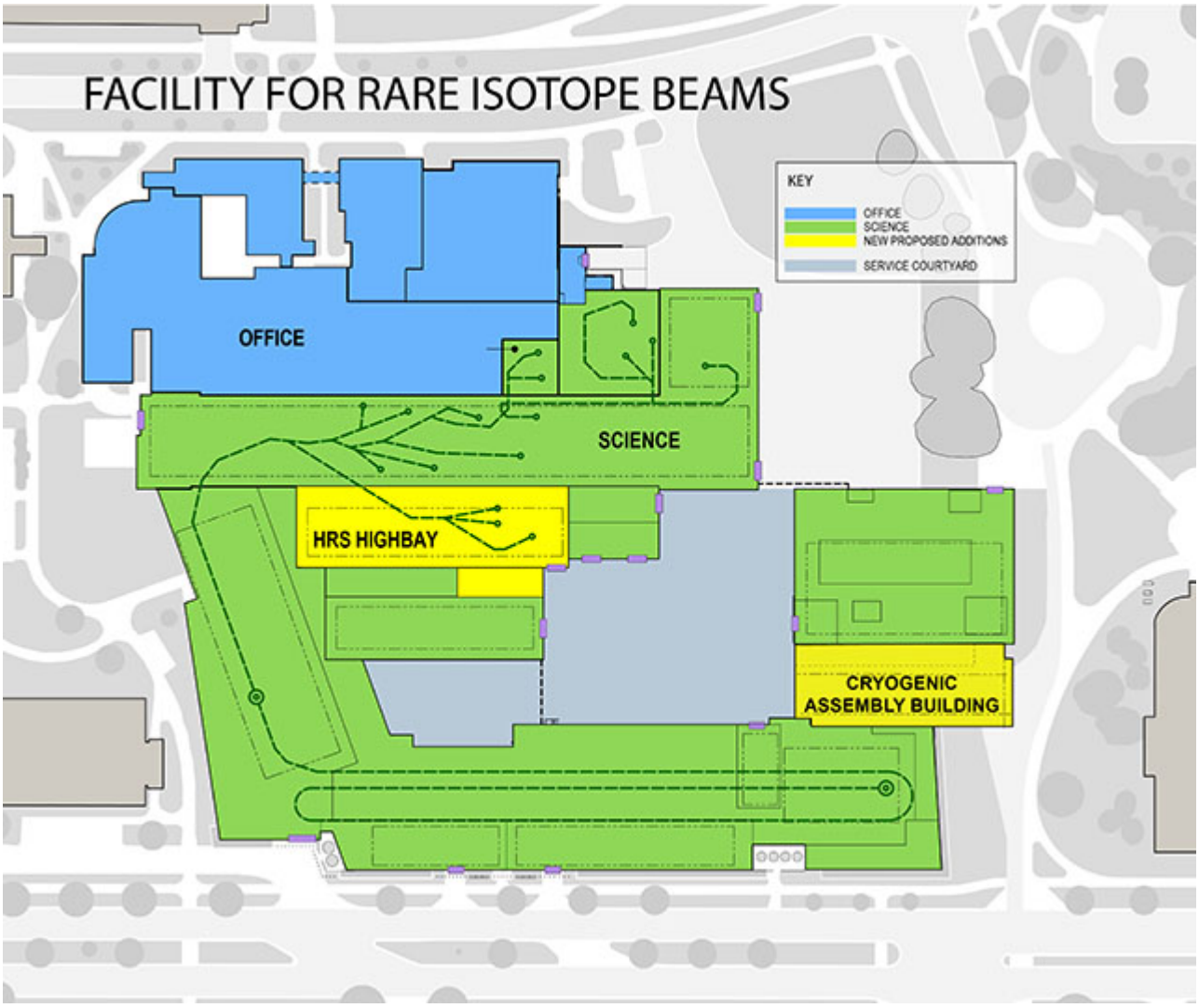
A versatile detector system will collect most information on the decays of the rare isotopes produced at FRIB.

FRIB will be able to produce isotopes in distant areas of the chart of nuclei starting from the first days of its operation. The reach of the facility will enable studies of nuclei both directly involved in the r-process and nuclei that are very loosely bound systems, where nuclei may self-organize differently from nuclei close to stability. The efforts of the FRIB Decay Station Working Group concentrate on designing a versatile detector system, which can efficiently collect the most information on the decays of the exotic isotopes produced at FRIB.

To make the most of FRIB beams, sensitive experimental multidetector arrays are planned which will have the capabilities necessary to measure the complex, multistep, multi-radiation decay modes expected in nuclei far from stability. The Decay Station will use modular, rapidly interchangeable detection systems forming arrays with large solid angle coverage and broad dynamic range. The key components will make use of the variety of ion implantation arrays, high-resolution gamma-ray spectroscopy systems, scintillator-based total gamma-ray absorption arrays and arrays of neutron-energy spectrometers and neutron counters. The design will involve available existing detectors which will be gradually replaced and augmented with new generation detectors to be able to fulfill challenges posed by the experiments at FRIB at its full 400 kW beam power.

The project involves 11 universities and five national laboratories will be led jointly by Oak Ridge National Laboratory, the University of Tennessee, and FRIB researchers. The construction of individual systems will be shared among participating institutions. A workshop to discuss a FRIB Decay Station whitepaper is scheduled for 24-25 January at Michigan State University. Individuals interested in contributing should contact one of the working group conveners: Robert Grzywacz (rgrzywacz@utk.edu), Sean Liddick (liddick@nscl.msu.edu), Darek Seweryniak (seweryniak@anl.gov), and Nick Scielzo (scielzo1@llnl.gov).

MSU Board of Trustees authorizes FRIB to plan for two additions



FRIB map of planned new additions.

On 15 December, the MSU Board of Trustees (BOT) authorized FRIB to begin planning for new additions to the facility.

• A 12,000-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. 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.

• A 31,000-square-foot High Rigidity Spectrometer and Isotope Harvesting Vault to house research equipment for isotope harvesting and to provide experimental space for the FRIB science program.

The board's planning approval allows FRIB to engage an architectural/engineering firm through final design. FRIB will seek MSU BOT authorization to proceed with the projects in early 2018. FRIB's Conventional Facilities and Infrastructure Division will lead a collaborative effort to accommodate all impacted staff members and functions.

DOE-SC Office of Project Assessment Review held 5-7 December

focus of the review was to assess overall FRIB Project

The DOE-SC Office of Project Assessment's (OPA) review of FRIB was held 5-7 December. Reviewers are pictured above.

The DOE-SC Office of Project Assessment's (OPA) review of FRIB was held 5-7 December. The main progress since the last review in June 2017, with a focus on technical progress.

The review committee was organized into four subcommittees, and FRIB staff gave 51 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 22-24 May 2018.

Technical construction nearly 80 percent complete; installations continue

Technical construction is now 78-percent complete on the FRIB Project. Technical installations continues, with the project meeting new milestones on a regular basis. These articles highlight significant progress since what was featured in our last issue in July.

FRIB cryogenic plant makes first liquid helium; plant on track to operate in 2018

The FRIB cryogenic plant made its first liquid helium at 4.5 kelvin (K) on 16 November.

The FRIB cryogenic plant made its first liquid helium at 4.5 kelvin (K) on 16 November. Making cold helium is critical to operating FRIB's linear accelerator. FRIB's beam-accelerating cryomodules contain superconducting radio frequency cavities that must

FRIB's two cryogenic cold boxes (the upper and lower cold boxes) work in tandem to cool helium to extremely low temperatures. The upper cold box lowers the temperature from 300 degrees K to 60 K. The lower cold box serves as the second step in the helium-cooling process, dropping the temperature from 60 K to 4.5 K.

Due to the focused efforts of its staff, the FRIB cryoplant was completed in December 2017 is on track to operate in 2018. The system utilities are in place, the oxygen-deficient hazard (ODH) system is complete, and the commissioning and performance testing of the warm compressor is finished.

FRIB staff have collaborated and used work-for-others (WFO) contracts with the Thomas Jefferson National Accelerator Facility (JLab), which have allowed the staff to benefit from the experience and lessons

operate at temperatures hundreds of degrees below zero to be superconducting. The cold helium will make the cavities superconducting.

learned at JLab. FRIB also established the MSU Cryogenic Initiative, one of the four focus areas of the Department of Energy's 2017 traineeship grant sole award to MSU.

FRIB achieves accelerator milestones acceleration of argon, krypton through RFQ

A view inside the linear accelerator tunnel at FRIB shows substantial technical progress on the accelerator beamline. (Photo credit: Kurt Stepnitz, Communications and Brand Strategy)

FRIB marked significant accelerator progress this past fall, with the successful commissioning of the front end. FRIB's front end – where the ion beam will start – was completed in May 2017, 16 months ahead of schedule. Following completion of the front end technical construction, in August a beam of argon ions was extracted from the ARTEMIS room temperature electron cyclotron resonance source with intensity necessary to achieve Key Performance Parameters (KPP). Commissioning of the front-end system was authorized by MSU in September, culminating in the acceleration of an argon beam ($^{40}Ar^{9+}$) by the RFQ to an energy of 500 keV/nucleon and transported through the Medium Energy Beam Transport line at the end of September. In early October, a test beam of krypton ($^{86}Kr^{17}$) was accelerated successfully by the RFQ to the end of the MEBT to the same energy.

Read about more technical installation progress online:

- FRIB installs warm diagnostic chambers in linear accelerator tunnel
- First β=0.085 cryomodule moved into beamline
- FRIB places first β=0.29 cryomodule
- FRIB places first matching cryomodule

FRIB users at University of Tennessee highlight FRIB involvement

The University of Tennessee (UT), Knoxville Physics and Astronomy Department featured a story about FRIB in its summer 2017 newsletter for alumni and friends. The article highlighted the role several UT physicists have in the science driving FRIB, and in shaping FRIB's direction, and explained why physicists want to study rare isotopes, their applications, and more.

UT Professor Kate Jones is a member of FRIB's Science Advisory Committee, which provides the FRIB laboratory director advice on scientific choices, vision, and matters related to optimizing the scientific discovery potential of FRIB. In addition to Dr. Jones, other UT experimental physicists are preparing for science at FRIB by building instruments and techniques that will be used to conduct experiments at FRIB. Additionally, UT physics faculty, post docs and students are engaged in the FRIB Theory Alliance, a coalition of scientists from universities and national laboratories, who are

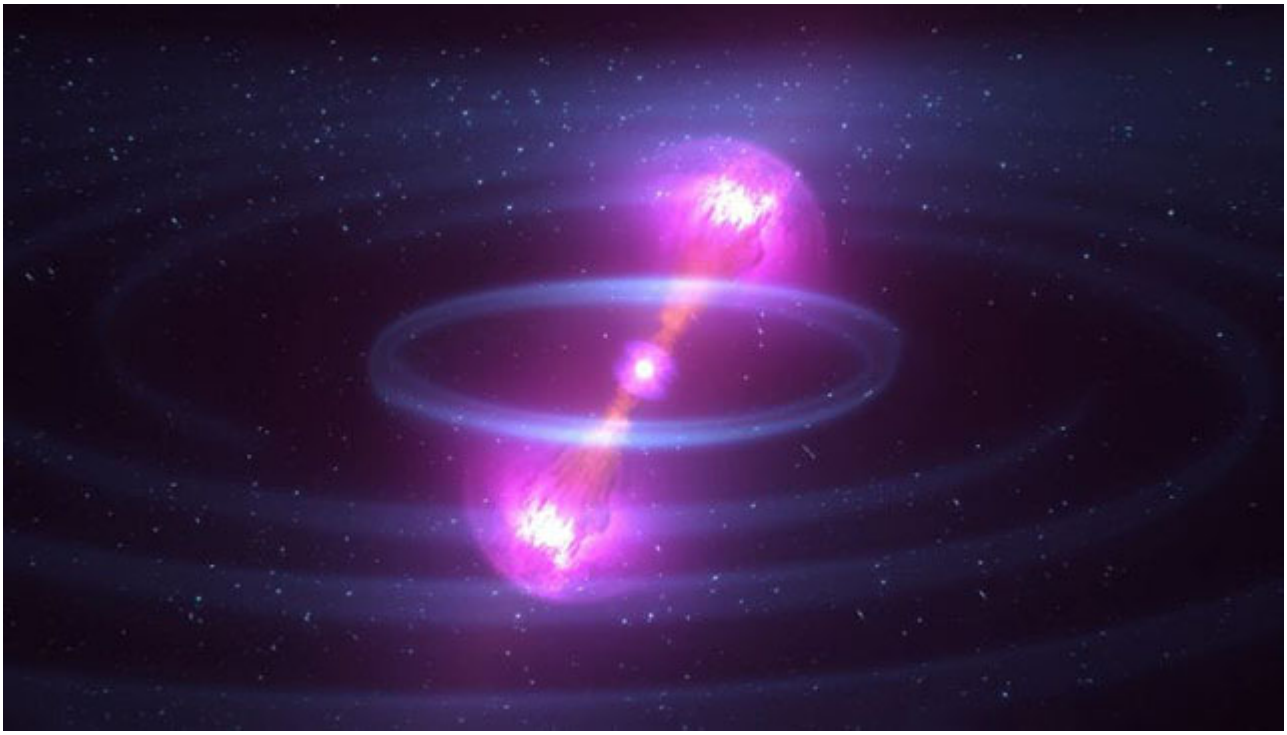
working to advance theory related to diverse areas of FRIB science, optimize the coupling of theory and experiment, and stimulate the field though education, collaborations, and international initiatives.

UT and FRIB have a long-standing partnership that benefits both laboratories. UT faculty – both current and former members – have been closely engaged in the ongoing development of FRIB.

Read the full article in UT's Cross Sections: The Newsletter for UT Physics Alumni & Friends (PDF) (pages 1 and 4).

Spectacular LIGO gravitational wave discovery identifies neutron star mergers as a source of r-process elements

by Charles Horowitz (Indiana University Bloomington) and Rebecca Surman (University of Notre Dame)



This image captures phenomena observed following the neutron star merger known as GW170817. They include gravitational waves (pale arcs), a near-light-speed jet that produced gamma rays (magenta), expanding debris from a kilonova that produced ultraviolet (violet), optical and infrared (blue-white to red) emission, and, once the jet directed toward us expanded into our view from Earth, X-rays (blue). Credits: NASA's Goddard Space Flight Center/CI Lab

On 17 August, the merger of two neutron stars was observed with gravitational waves (GW) by the LIGO and Virgo detectors, and is known as the GW170817 signal. The Fermi Telescope independently detected a short gamma ray burst. Extensive follow up observations detected this event at X-ray, ultra-violet, visible, infrared, and radio wavelengths.

This is the first GW observation of neutron stars. Previous GW detections were of black holes. Neutron stars are important because, unlike black holes, they should have strong associated electromagnetic signals, can contribute to nucleosynthesis, and may allow the determination of the equation of state of dense matter.

The optical and infrared light curves for this event are consistent with a kilonova. This is an electromagnetic signal, powered by the radioactive decay heating of newly formed rapid neutron capture (r-process) heavy elements. Features in the optical spectrum, and its very red color that peaks in the infrared, are consistent with the large optical opacity of lanthanide heavy elements. The brightness of the kilonova suggests this event ejected 0.03 to 0.05 solar masses of r-

process material. The ejecta mass, together with the merger rate inferred from this one event, implies that neutron star mergers are a major, perhaps dominant, site of r-process nucleosynthesis in the universe. This may explain the origin of gold, platinum, and about half of the chemical elements heavier than iron.

Detailed analysis of the GW signal places limits on the gravitational polarizability of neutron stars. The polarizability is how the tidal field of one star distorts the other star and is a strong function of the neutron star radius. The largest neutron star radii and the stiffest equations of state may be ruled out by these observations.

Future work will deepen our understanding of neutron star mergers and their role in galactic chemical evolution. LIGO and Virgo are not yet operating at designed sensitivity. When they reach designed sensitivity, they should detect GW events at about eight times the present rate. Future detections will pinpoint the merger rate and indicate whether GW170817 was a typical or unusual event. FRIB is poised to play a key role in the era of multi-messenger astronomy. Many of the exotic, neutron-rich nuclei that make up the crusts of neutron stars and are synthesized in mergers will be accessible in the laboratory for the first time at FRIB. Knowledge of their nuclear properties is crucial for interpreting kilonova signals and understanding the yields of r-process nuclei in merger events.

On 1 December, the Joint Institute for Nuclear Astrophysics – Center for the Evolution of the Elements (JINA-CEE), a multi-institutional Physics Frontiers Center funded by the National Science Foundation (NSF), hosted a livestream event to bring scientists together to discuss the nuclear science impacts of the groundbreaking GW discovery. Read more about it in the article below.

Scientists livestream discussion about future research directions for nuclear science following gravitational wave discovery

Scientists from around the globe participated in a livestream event on 1 December to discuss the nuclear science impacts of the groundbreaking discovery of gravitational waves from two colliding neutron stars announced worldwide in October.

Scientists from around the globe participated in a livestream event on 1 December to discuss the nuclear science impacts of the groundbreaking discovery of gravitational waves from two colliding neutron stars announced worldwide in October.

The scientists discussed how the discovery likely signals that many more similar observations are on the horizon. Gravitational waves open up a new window into the cosmos, and nuclear science will play an important role in turning the window into a precision tool for analyzing the fundamental properties of matter and the creation of elements. Advances in nuclear science – specifically in models, theory, and experiments at next-generation research facilities – will unravel the underlying mysteries of heavy-element creation.

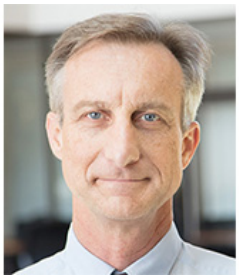
Nearly 500 participants tuned in to the livestream or have watched the recording, including participants in Greece, China, Switzerland, Sweden, the United Kingdom, and across the United States.

The Joint Institute for Nuclear Astrophysics – Center for the Evolution of the Elements (JINA-CEE), a multi-institutional Physics Frontiers Center funded by the National Science Foundation (NSF), hosted the livestream. The event brought together nuclear physicists, astronomers, and computational astrophysicists to discuss further research directions based on the gravitational-wave science discovery and follow-up observations.

Dan Kasen, associate professor of physics and astronomy at the University of California Berkeley, said experiments at FRIB will shine light on certain properties of nuclei. “What we really want to know is the properties [of nuclei] very far from stability [and] that is what various experiments are working on including the Facility for Rare Isotope Beams,” he said. “We have now this pure sample of r-process right at its production site and we can try to analyze that. It’s really just the start of an exciting time and it should be really interesting to see what happens in the years to come.”

Read the complete article at frib.msu.edu.

Warren Rogers wins American Physical Society prize



Warren Rogers

Warren Rogers of Indiana Wesleyan University and member of the FRIB Users Organization, was awarded the 2018 Prize for a Faculty Member for Research in an Undergraduate Institution from the American Physical Society (APS).

APS is a nonprofit organization with 54,000 members that works to advance and spread knowledge of physics via publications, scientific meetings, education, and public outreach. According to APS, Warren received the award "for his essential contribution to the exploration of atomic nuclei beyond the neutron drip line and his conception and continued leadership of the Conference Experience for Undergraduates program."

At NSCL, Warren measured unbound states in neutron-rich nuclei using the Modular Neutron Array-Large multi-Institutional Scintellator Array (MoNA-LISA) neutron detector arrays and the sweeper magnet. He is one of the founding members of the MoNA collaboration.

For more information, see the announcement on the APS website. Congratulations to Warren!

Annual Low-Energy Community Meeting held 3-4 August

by Heather Crawford, FRIB Users Organization Chair

More than 200 participants attended the Low Energy Community Meeting.

There were 215 participants at this year's Low Energy Community Meeting (LECM), which was held 3-4 August at Argonne National Laboratory. The annual meeting serves as a time for nuclear scientists in the low-energy nuclear physics community to interact and discuss future plans, initiatives, and facilities. The program of the main meeting consisted of plenary sessions and 12 working group sessions. The program with links to the talks can be found on the meeting website.

At the end of the LECM meeting, summaries of the working group sessions were presented, and the following resolutions were accepted unanimously:
• FRIB remains the low-energy community's top priority. The community eagerly anticipates the completion of FRIB and the forefront science this facility will enable.
• Operation of the national user facilities Argonne Tandem Linac Accelerator System (ATLAS) and NSCL at optimal levels and strong support for research groups is critical for the field. The Association for Research at University Nuclear Accelerators (ARUNA) facilities are a central part of the low-energy science program and their continued operation is crucial. The community strongly supports the funding of these facilities and the associated research.
• The community endorses the prompt initiation and timely completion of the Gamma-Ray Energy Tracking Array (GRETA) construction project, a key instrument for low-energy nuclear science.
• The FRIB Theory Alliance is an essential component of the field. The bridge faculty and theory fellowship positions at universities and national laboratories help to grow capability in this important aspect of our community. The community strongly endorses continued support of the FRIB-TA, its programs, and investment in computational theory and related astrophysics.

Five satellite workshops were held prior to the main meeting. A half-day workshop on FRIB Day 1 Science included science-based presentations that explored the reach and nature of programs possible with early FRIB beams and the theory in support of those programs. There were three workshops focused on equipment, which included GRETA, the high-rigidity spectrometer (HRS), and a Separator for Capture Reactions/Jet Experiments in Nuclear Structure and Astrophysics (SECAR/JENSA) collaboration meeting. Finally, the FRIB Theory Alliance annual meeting occurred in conjunction with the working group sessions.

News from the FRIB Users Organization Executive Committee

by Heather Crawford, FRIB Users Organization Chair

The FRIB Users Organization (FRIBUO) Executive Committee wants to thank everyone in the community for their involvement and contributions to the Low Energy Community Meeting this past August (see LECM article above), and in particular the workshop on FRIB Day 1 Science. The presentations are available online , and the discussions during the workshop have given us all a great starting point toward planning for early science at FRIB in only a few years' time.

Also, please be reminded that the FRIBUO Executive Committee elections are ongoing, with voting open until 31 December 2017. You'll have received a link in your email to sign and vote — please do so, and look for the results of the election in the next user update and online at fribusers.org.

Theory Alliance update

by David Dean, Oak Ridge National Laboratory

As the FRIB Theory Alliance (FRIB-TA) enters its fourth year, it is time to reflect on the recent past and begin the drive toward our exciting future. During the initial two-year grant, the FRIB-TA established the FRIB theory fellowship program, hired two theory fellows, held several meetings, established a charter and operating procedures, and began to establish its identity as a national effort that will broadly pursue theoretical developments related to FRIB. Witek Nazarewicz, as the initial director, and Filomena Nunes as managing director, have led us to a great start.

As the FRIB-TA begins its new three-year cycle, we see new opportunities at the horizon. We are in the process of establishing the first FRIB-TA Faculty Bridge position at Washington University in St. Louis (Missouri). This strategic position affords our field the opportunity to gain a faculty line at a top-rated university. We also began a search for a third FRIB-TA fellow and look forward to identifying a highly qualified candidate for that position.

The scientific case for FRIB remains particularly strong and in just four short years, this world-leading facility will begin to produce scientific results that should begin to unravel the mysteries of the nuclear quantum many-body problem in neutron rich nuclei. With that data, theorists should be able to continue refining the nuclear interaction as we develop techniques that enable one to predict nuclear properties. We should also anticipate some incredible and new physics results coming from ancillary areas of physics that affect our interpretation of the nuclear problem. For example, LIGO and VIRGO just announced the first observation of gravitational waves coming from neutron star mergers. Gamma and x-ray emissions have been seen from the merger. The question on how heavy elements are produced in the universe thus becomes one of probing both an observable site and the physics of neutron rich nuclear systems. Since gammas were seen, we know that conditions exist for r-process nuclei to be produced. This is quite the boon for FRIB as its precision spectroscopy can be utilized to probe the precise nature of the decay patterns along the r-process path.

While neutron star mergers are just one of the many exciting frontiers that the FRIB-TA will pursue, it is no doubt important to keep our collective eyes on the ball. Why is there a theory alliance? Our goals are broad: to foster advancements in theory related to diverse areas of FRIB science; to optimize the coupling between theory and experiment; and to stimulate the field by creating permanent theory positions across the country. FRIB-TA will foster both scientific creativity and collaboration across the broad spectrum of science that FRIB will pursue. We are looking forward to serving the community in the next few years as we build upon the initial success of FRIB-TA. With FRIB moving ”on to the mass shell” as a theorist might say, it is time to turn our theoretical developments toward interpreting new data and proposing new experiments that lead to better theory. Day One FRIB science, an important theme of the recent Low Energy Community Meeting, is upon us.

Nuclear Structure 2018 and LECM 2018 conferences to be held at MSU

The Nuclear Structure 2018 (NS2018) conference will be held on 5-10 August 2018, in East Lansing, Michigan. NS2018 will be hosted by NSCL/FRIB at MSU. The focus of the conference will be nuclear structure physics at the extremes of isospin, spin and excitation energy.

A block of rooms has been reserved at the Marriot Residence Inn in East Lansing. Also a block of rooms has been reserved on campus at MSU’s Owen Graduate Hall to offer a reduced price accommodation for participating students. Rate information will be provided in the second announcement.

The conference will consist of invited talks, contributed talks, and a poster session.

The timeline for announcement distribution, abstract submission, and registration is:
• January 2018 - second announcement with call for abstracts and registration open,
• 1 March 2018 - abstract submission deadline,
• 2 April 2018 - contributed talks selected and speakers notified,

• 16 April 2018 - early registration deadline,
• 1 May 2018 - third announcement with program details,
• end of June 2018 - housing reservation deadline.
Updated information on Nuclear Structure 2018 will be posted online. All correspondences should be made through:

Nuclear Structure 2018
640 South Shaw Lane
Michigan State University
East Lansing, MI 48824
USA

Phone: (517) 355-9671
Fax: (517) 353-5967
Email: NuclearStructure2018@frib.msu.edu

Immediately following the NS2018 conference, the annual Low-Energy Community Meeting (LECM) will be held at the same venue as the conference. The meeting will begin in the afternoon of 10 August and will conclude on 11 August. Please note that while there is no registration fee associated with the LECM, a separate registration is required.

FRIB in the news

Science published an article about how FRIB will be key to understanding how neutron-star mergers make heavy elements: An earthly search for gold's cosmic origins.

Contributors this issue

- Heather Crawford
- David Dean
- Thomas Glasmacher
- Robert Grzywacz
- Charles Horowitz
- Hiro Iwasaki
- Bradley Sherrill
- Rebecca Surman
- Witek Nazarewicz

LOOKING AHEAD

4-6 April Experimental Systems Advisory Committee Review of FRIB

10-12 April	Accelerator Systems Advisory Committee Review of FRIB
22-24 May	DOE-SC Office of Project Assessment Review of FRIB (tentative)
5-10 August	Nuclear Structure 2018 (NS2018) Conference in East Lansing, Michigan
10-11 August	Low Energy Community Meeting at FRIB/NSCL in East Lansing, Michigan

The FRIB Laboratory Update for Users is published by the FRIB Laboratory and distributed via email.
Please email questions, comments, and contributions to communications@frib.msu.edu.

Facility for Rare Isotope Beams | Michigan State University | 640 South Shaw Lane | East Lansing, MI 48824 | (517) 355-9672 | frib.msu.edu

Michigan State University is establishing FRIB as a scientific user facility for the Office of Nuclear Physics in the U.S. Department of Energy Office of Science.