

FRIB PROJECT

UPDATE FOR USERS

NOVEMBER 2014



Left: A view of the first concrete placement on October 23 for the tunnel lid. Below: The circled region on the rendering shows where the concrete placement occurred.

*Photo by Greg Kohuth/
Michigan State University
Communications and Brand
Strategy*



Civil Construction Proceeding Ahead of Schedule

Story contributed by Brad Bull, Conventional Facilities and Infrastructure Division Director

Good progress is being made in constructing the linear accelerator tunnel, and work is nine weeks ahead of schedule. The surface building will be constructed in two halves in order to accelerate readiness of the east section of the building. This will allow the front end to be installed a year earlier than originally planned in the project baseline.

In the past few months, structural steel I-beams were installed for the tunnel lid as well as reinforcing steel. With reinforcing

steel, radio frequency (RF) grounding mesh has also been placed to shield the sensitive beam diagnostic instruments from interference. Backfill work began in August, with 4,000 tons of backfill placed to date between the tunnel walls and the earth-retention system.

Additionally, concrete for the first tunnel lid section (on the far-east end) was placed in mid-October, while the biggest concrete placement of the entire project — for a large section of the tunnel — is

planned for early 2015. The tunnel will be enclosed in December.

In the target area, installation of reinforcing steel and mud mat — a foundation for waterproofing — is underway, with steel installed in October. Additionally, a temporary retaining wall to hold the backfill on the west end of the tunnel is planned. It will allow construction to continue above the tunnel lid to the east, while the target-area concrete placements continue. The wall will be complete in January or February 2015.

Follow along with FRIB progress by checking the construction camera at frib.msu.edu.

DOE-SC Approves Critical Decision CD-3b

Story contributed by Thomas Glasmacher, FRIB Project Manager

On August 26, Dr. Patricia Dehmer, the Department of Energy Office of Science acquisition executive for FRIB, approved *Critical Decision CD-3b: Start of Construction of the Accelerator and Experimental Systems for the Facility for Rare Isotope Beams (FRIB) Project*. With this approval the FRIB Project Team is in an excellent position to finish the FRIB Project in the next six years and to realize the nuclear science community's aspiration for an advanced rare isotope beam facility.

Joint DNP, JPS User Meeting held in October

Story contributed by Brad Sherrill, FRIB Associate Laboratory Director for Users

In conjunction with the APS/JPS Fall Division of Nuclear Physics Meeting, HAWAII2014, the RIKEN Radioactive Ion Beam Factory user group and the FRIB Users Organization held a joint informational meeting on October 9. The meeting was well attended and a number of topics of joint interest were discussed. Presentations included updates from RIBF, NSCL, and FRIB and reports from the RIBF Users Executive Committee and the FRIBUO Users Executive Committee. Specific joint projects SpiRIT, the time projection chamber for the SAMURAI magnet collaboration, and the Compton-suppressed Ge Clover Array

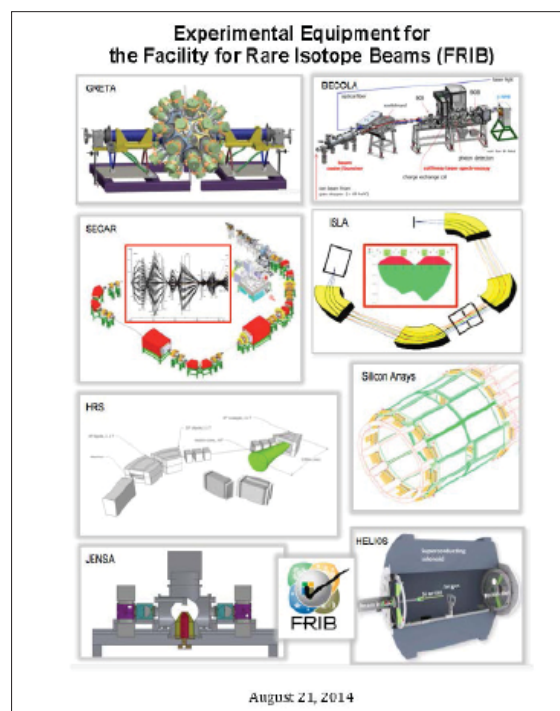
were discussed. These serve as examples for future international sharing and utilization of research equipment. The status of JUSEIPEN, which enables development of joint experimental activities between the United States and Japan, was presented and the need for an extension of this successful initiative was discussed. Finally, an update was presented on the astrophysics-related joint activities of the Joint Institute for Nuclear Astrophysics, JINA, and Japan Forum of Nuclear Astrophysics. Special thanks go to the chairs of the user groups Nobu Imai and Michael Smith for organizing the meeting.

Low Energy Nuclear Physics and Nuclear Astrophysics DNP Town Meetings Resolutions Support FRIB Completion and Initiation of Science Program

Story contributed by Brad Sherrill, FRIB Associate Laboratory Director for Users

Completion of FRIB and initiation of its science program was the top priority of both the Nuclear Astrophysics and the Low Energy Nuclear Physics Town Meetings held at Texas A&M in August. A copy of the full text of the resolutions can be found at www.lecmeeting.org/preambleAndResolutionsTAMU2014.pdf.

Each town meeting generated a set of resolutions and then both groups together agreed on a joint set of resolutions that reflected the top priorities of both communities. Overall, the community expressed a comprehensive plan to make the best use of FRIB when it is completed by recommending appropriate support for operations and upgrades at current facilities, enhanced support for the needed theory initiatives, and strong support for research



The report pictured at left was prepared for the APS DNP Low Energy Town Meeting in August by the FRIB Users Organization Working Groups, working with User Organization Chair Michael Smith and other members of the Executive Committee.

initiatives for FRIB including completion of GRETA now that GRETA is a success, building of SECAR, and new initiatives such as the High Resolution Spectrograph. Michael Smith summarized the equipment opportunities in his talk that can be found at www.lecmeeting.org/program.htm.

The town meetings also identified outstanding opportunities for the National Science Foundation in the effective utilization of NSCL and upgrades of ReA3 to ReA12.

groups during FRIB construction.

Both meetings also recognized the need for targeted equipment

FRIB Theory Center and Search for National FRIB Theory Fellow Underway

Story contributed by Witek Nazarewicz, FRIB Chief Scientist

In the spring of 2013, the FRIB laboratory director constituted the FRIB Theory Center Steering Committee (TCSC) with the mandate to “determine the required ingredients, including ramp-up funding options and an appropriate organizational structure for a future FRIB Theory Center, and then proceed to work with the agencies and develop a doable path forward.”

The idea of the national FRIB Theory Center, comprising a broad theory community, was endorsed by the 2013 Low-Energy Community Meeting and, very recently, by the 2014 Low-Energy Town Meeting.

The long-term goals of the center are:

- Deliver excellent research in theory relevant to the big questions in FRIB science;
- Serve as a focal point for stimulating continuous interactions between theory and experiment, drawing theory activity toward those problems relevant for the science at FRIB;
- Attract young talent through the National FRIB Theory Fellow program;
- Create permanent positions in FRIB theory across the country through the FRIB Bridge Faculty program;
- Strengthen FRIB theory in areas of most need through the FRIB Theory visiting program;
- Foster interdisciplinary collaborations;
- Coordinate educational programs in advanced low-energy nuclear theory;
- Coordinate international initiatives in theory of rare isotopes.



Elena Litvinova



Heiko Hergert

In the spring of 2014, a proposal was submitted to DOE that constitutes the starting point of an FRIB Theory Center. As a first step, FRIB-TCSC has launched a search for an FRIB Theory Fellow. Review the posting at www.frib.msu.edu/content/frib-theory-fellow. The successful candidate will conduct independent or collaborative research at one of the FRIB Theory Center partner institutions. A single FRIB Theory Fellow position was first introduced at MSU in 2011. The program has proven to be highly competitive and has increased the visibility of low-energy nuclear theory worldwide. The first Fellow, Elena Litvinova, hired in 2012, moved onto a faculty position after only one year. The second Fellow, Heiko Hergert, was hired by MSU in 2014.

Broadly speaking, FRIB Theory Fellows must have great promise for high scientific achievement and are expected to advance into open faculty or permanent staff positions in the field within five years of their initial appointment. The new twist on the ongoing search is that the successful FRIB Theory Fellow will be placed at any of the FRIB Theory Center partner institutions. The selection committee, composed of members of the FRIB-TCSC and chaired by Erich Ormand from LLNL, will evaluate the quality and feasibility of the research plans and their relevance to the science of FRIB. The selection committee will also consider the appropriate matching of the proposed research plan with the strengths of the proposed host group.

It is expected that the Theory Fellows will spend a significant fraction of time at FRIB, enabling a fruitful exchange. In the long-term, it is expected that the Fellow program will grow into six FRIB Theory Fellows, two located at FRIB full time, and the others at various institutions in the United States, with 52 percent of the financial support coming from DOE and the other 48 percent from the host institution.

User Equipment White Papers Prepared for NSAC Long Range Plan

Story contributed by Brad Sherrill, FRIB Associate Laboratory Director for Users

In preparation for the NSAC Long Range Plan, many of the equipment working groups have prepared or will prepare white papers outlining their scientific justification and plans. Many of these white papers can be found at www.lecmeeting.org/whitepapers.html or on the FRIBUO website www.fribusers.org. Examples that have been posted include white papers for GRETA, the High Rigidity Spectrograph, ISLA, and the ReA12 Upgrade. If your group has a white paper for distribution, please contact Brad Sherrill or Michael Smith to have it posted.

Master Slave Manipulator Allows Maintenance in Hot Cell

Story contributed by Richard Bennett, Remote Handling Senior Engineer

Magnets and other devices installed in the hot cell will become activated over years of FRIB operation. Planning ahead, FRIB is installing a master slave manipulator (MSM) to allow for maintenance, when waiting for the activation to decay to allow for hands-on maintenance would be impractical.

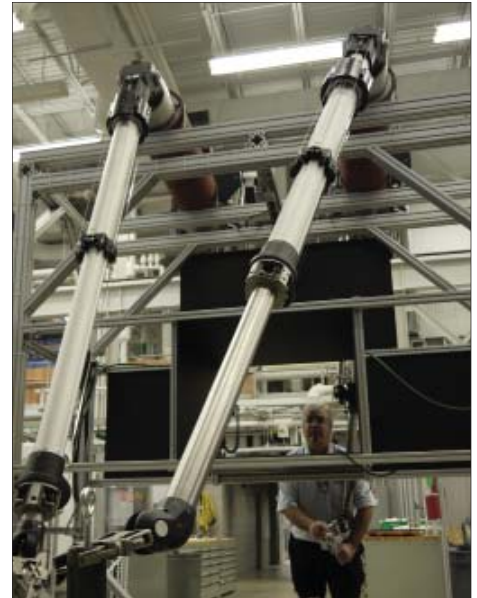
The MSM is a mechanical device that transmits the motions of an operator working from a shielded area into the area where the activated component is. At FRIB, the operator will stand behind a 3-foot-thick concrete wall and look through an 18-inch-thick leaded-glass shield window to work on a component about 10 feet away. A vision system will be used to improve visibility as it can be difficult to see when working on equipment under these conditions.

Effective use of the MSM requires trained operators and equipment that is designed to be maintained by the MSMs using

appropriate tooling. To prepare for these unique conditions, FRIB has constructed a cold-test facility that simulates the operation of the MSMs in the FRIB hot cell. Component designers have been trained to familiarize them with MSM operation so that the knowledge can be applied to component designs.

The development of FRIB's remote-handling system is the result of a long-term collaboration with Oak Ridge National Laboratory. Additionally, the design of the cold-test facility is based on a design previously implemented at ORNL.

The cold-test facility will allow FRIB to develop maintenance procedures and, using equipment mock-ups, develop tooling and verify that the planned maintenance is possible. The savings and risk reduction resulting from the ability to identify problems and fix them early in the design process is expected to pay for



Richard Bennett practices remote assembly of components using the FRIB cold-test facility.

the cost of the facility. The facility uses the same MSMs that will be installed in the FRIB hot cell. Purchasing them early provides the benefits of a cold-test facility without increasing the cost to the project.

DNP Honors Brad Sherrill for Service

The Division of Nuclear Physics of the American Physical Society awarded Brad Sherrill, MSU University Distinguished Professor and FRIB associate laboratory director for users, the 2014 DNP Service Award. Brad's award citation reads: *"For his exemplary service to the Division of Nuclear Physics and his skillful leadership that have enhanced the vitality of the Division as a unit of the American Physical Society, and for his tireless efforts in advocating for nuclear science to a broad audience."*



Brad Sherrill

"I am very gratified by the recognition of the broader nuclear science community for the efforts we make to advance the field," Brad said. "I think service is an important component of what we do and the award confirms that others agree."

Looking Ahead for FRIB Project

December 16-18
Accelerator Systems
Advisory Committee

February 20, 2015
Experimental Systems
Room Temperature Magnet
Final Design Review

March 31- April 2, 2015
DOE-SC Office of Project
Assessment Review