

Reflecting on 2023 and looking ahead to 2024

We hope you are all doing well as we say farewell to 2023. As we head into 2024, let's take a moment to reflect on this past year of FRIB operation, which included the second Program Advisory Committee (PAC2) and many other developments to move FRIB's science program forward.

First, a snapshot of FRIB operation as of 1 December:

- Since the start of user operation in May 2022 FRIB has delivered more than 210 rare isotope beams to experiments and supported 826 participants, including 210 students, across 63 experiments, 234 institutions, and 65 countries.
- FRIB delivered 3,948 beam hours with 92 percent availability in FY23, meeting our stated FY23 goal for operations. In FY2024, FRIB plans to deliver 3,750 hours out of 4,400 scheduled hours, subject to federal FY24 appropriations.

To support the user community with broadened discovery opportunities, we:

- have **increased rare isotope production rates by ten**, since the start of operation in May 2022
- were authorized to **run user experiments at 10 kW**, doubling FRIB's primary beam power from the 5 kW run earlier in the year. The updated beam list is at frib.msu.edu/beams. This is a milestone of FRIB's six-year power ramp-up plan, which follows successfully completing the Accelerator Readiness Review 10 (ARR 10) for 10 kW user operations.
- brought into user operation in 2023 the **high-power electron cyclotron resonance ion source** as a second ion source
- started the **ReA standalone program** that enables unique measurements with long-lived rare isotopes, allowing for multi-user

operations

Accelerator goals for 2024 include accelerate a high-power (up to 10 kW) uranium beam onto target, which will be the highest uranium power in the world, and to complete the required work in order to start delivering 20 kW primary beams on target (in the first quarter of FY25).

Three manuscripts based on FRIB results have been published, two of them in *Physical Review Letters* ([Microsecond Isomer at the N=20 Island of Shape Inversion Observed at FRIB](#) published in June 2023), with many others nearing publication – congratulations and thank you!

We are grateful for the continued trust the U.S. Department of Energy Office of Science (DOE-SC) has placed in us to operate FRIB as a DOE-SC user facility to enable discovery opportunities envisioned by FRIB's user community, supporting the mission of the DOE-SC Office of Nuclear Physics (ONP). The operating funds DOE-SC awarded in August will allow development of beams desired by the community, ramp up the FRIB power, and provide additional experimental capabilities. The yearly ONP budget supporting FRIB is subject to appropriation by the U.S. Congress. Additionally, the High Rigidity Spectrometer (HRS) cooperative agreement awarded in September provides funding over seven years to establish and operate HRS, which will support a multi-institutional user community of more than 500 scientists.

Thank you for your role in developing the new 2023 Long Range Plan for Nuclear Science through the federally chartered Nuclear Science Advisory Committee to define the U.S. nuclear science community's programmatic priorities for the next decade. The new plan, [“A New Era of Discovery: The 2023 Long Range Plan for Nuclear Science,”](#) was [released on 4 October](#) and provides a roadmap for advancing the nation's nuclear science research programs over the next decade. The plan strongly reaffirms the science case for FRIB's energy upgrade to 400 MeV/nucleon (FRIB400), and the HRS project, in the context of extraordinary opportunities for discovery opportunity that should be made possible by sustained investments by the U.S. government. Nationwide, [21 sites \(including FRIB\) hosted rollout meetings](#) on 6 October, updating attendees about the plan's local impacts. On 8 November, nuclear scientists from across the United States participated in a Nuclear Physics Day on Capitol Hill to inform elected officials and their staff about the plan. For more information, visit [NuclearScienceFuture.org](#).

Enhancing our global cooperation, in July the [Centre National de la Recherche](#)

[Scientifique and Michigan State University](#) established at FRIB the International Research Laboratory on Nuclear Physics and Astrophysics (IRL NPA). The IRL NPA will be permanently staffed with French scientists. In its [inaugural science meeting](#) 11-13 December at FRIB, participants discussed consolidating existing collaborations and launching new ones, and shared new proposals and ideas for opportunities to work together.

In other synergistic FRIB activities, the Isotope Harvesting Project started hot cell installation in November, working toward completion in 2024. To provide chip-testing capacity, [we are refurbishing the K500 cyclotron](#) to test electronics for space flight, and continue operating the fee-for-service program with the [FRIB Single Event Effects facility](#). We were honored to host for the first time the [21st International Conference on Radio-Frequency Superconductivity](#).

Throughout 2023, state, national, and international media outlets featured FRIB science and other endeavors, helping to articulate the public benefit of FRIB to retain the public's support. See some examples here, and read all of the FRIB-related articles on the [In the News page](#) of the FRIB website.

- [World-leading rare isotope facility is online in Michigan](#), Physics Today
- [Storied accelerator to test chips](#), Science
- [At this lab, the secrets of the atom — and the universe — are being discovered](#), USA Today via Yahoo News (originally published in the Detroit Free Press)

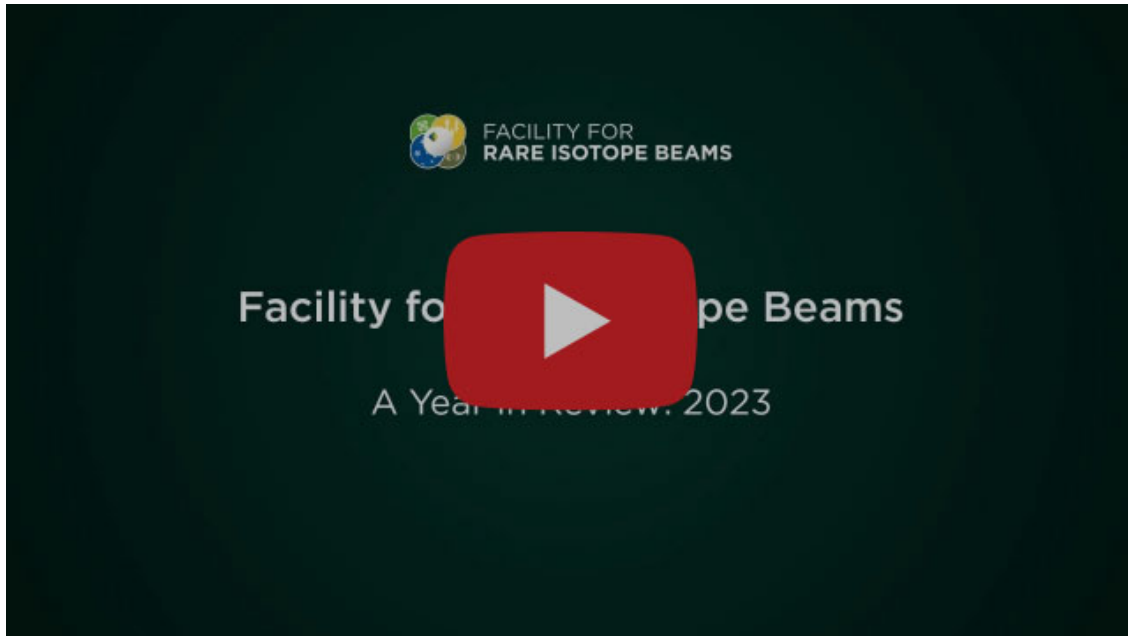
Additional FRIB-published news stories since our last issue in August are included below.

We are pleased to report on our efforts to build a more inclusive community. The [FRIB Research Code of Conduct](#) was introduced as part of the PAC2 call for proposals. In April 2023, the FRIB Diversity Advisory Committee proposed updates to the [FRIB Code of Conduct](#). The code underscores our commitment to providing an environment that is welcoming for everyone, including all FRIB employees, students, users, visitors, and participants in FRIB-sponsored activities. We are also investing in programming for FRIB team members to advance inclusive excellence and a sense of belonging for those who learn and work at FRIB. The program will be implemented in spring 2024, and will draw from evidence based research and practices that advance more inclusive organizations. We continue working to create an FRIB that is inclusive, welcoming, and representative of the global community we represent.

We wish you all the best for a restful, peaceful, healthy holiday season and a wonderful new year.

Sincerely,
Thomas Glasmacher
FRIB Laboratory Director

Alexandra Gade
FRIB Scientific Director



A look at FRIB's highlights and accomplishments that took place throughout 2023.

News

DOE-SC highlight: The Facility for Rare Isotope Beams after one year of operation

The U.S. Department of Energy Office of Science (DOE-SC) posted a highlight titled [“The Facility for Rare Isotope Beams after one year of operation”](#) about the experiments performed at FRIB in its first year of operation. The first experiments at FRIB—performed by collaborations of experimentalists and theorists from around the United States and the world—used the FRIB Decay Station Initiator, the GRETINA gamma-ray detection system at the S800 spectrograph, the FRIB fragment separator for new isotope discoveries, and the gas-cell area. [Read the highlight on the DOE-SC website.](#)

Two international artists selected for MSU residency at intersection of art,

science and technology

Michigan State University has announced the 2024 MSUFCU Arts Power Up artists-in-residence at FRIB. Abel Korinsky (representative of Studio Korinsky) of Berlin, Germany, will be in residence during the spring semester, and Violeta López López of Ávila, Spain, will be in residence during the fall semester. Korinsky and López will immerse themselves in the FRIB laboratory environment and explore this year's theme of nuclear astrophysics through their boundary-pushing work. This inaugural open call for artists is a collaboration between FRIB; the MSU Museum; the STEAMpower Project, Michigan State University's art, science and culture collaborative; and Arts MSU. This new residency fosters collaboration, exploration, experimentation and innovation on MSU's vibrant campus, culminating in the creation of groundbreaking artworks at the intersection of art, science and technology. [Read more.](#)

Lecture series hosts two speakers

This fall, FRIB hosted two speakers as a part of the Distinguished Nuclear Policy Lecture series. The series is a partnership between Michigan State University's James Madison College and FRIB that brings global policy experts to campus for talks about the political and scientific communities. This lecture series brings together experts and scholars from diverse backgrounds to discuss issues related to nuclear policy, arms control, and non-proliferation. The lectures provide insights, analysis, and perspectives on the current challenges and opportunities in the evolving field of nuclear policy.

- [Eugene Rumer](#), senior fellow and the director of the Carnegie Endowment for International Peace Russia and Eurasia Program
- [Rose Gottemoeller](#), lecturer at Stanford University's Freeman Spogli Institute for International Studies and research fellow at the Hoover Institution.

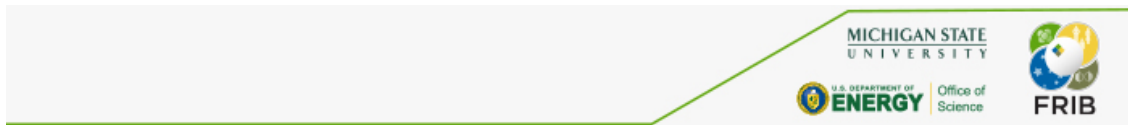
Video looks at FRIB's 2023 summer outreach programs

This summer, 248 students and community members participated in FRIB-hosted outreach and education programs. The outreach programs offered elementary, middle-school, and high-school students, undergraduate college students, and science teachers the opportunity to explore the world of science. [Watch the video on YouTube.](#)

Upcoming Events

Below is a list of upcoming events. For more, visit the [FRIB website](#).

- 21 January - Advanced Studies Gateway public Zoom talk: Emory Brown of Massachusetts Institute of Technology, Harvard Medical School, and Massachusetts General Hospital



Michigan State University operates FRIB as a user facility for the U.S. Department of Energy Office of Science (DOE-SC), supporting the mission of the DOE-SC Office of Nuclear Physics.

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