History

History of FRIB

Since the early 1990s, nuclear physicists had been discussing the need for a facility to produce intense beams of rare isotopes. A Nuclear Science Advisory Committee (NSAC) taskforce presented its recommendations on how to proceed to the National Science Foundation (NSF) and U.S. Department of Energy (DOE) in 1999. It closely reflected a plan for rare isotope beam production proposed by Michigan State University (MSU). The National Superconducting Cyclotron Laboratory (NSCL) leadership and scientists saw this as their next opportunity and immediately began developing detailed design plans. By year's end, they made a presentation to NSF and DOE on the benefits of siting the new facility at MSU, which included a proposal for in-flight fragmentation. After a rigorous competition, the DOE Office of Science (DOE-SC) awarded the project to MSU in 2008.

The partnership to create, build, and operate the $730 million Facility for Rare Isotope Beams (FRIB) has delivered a world-unique DOE-SC user facility that ensures the nation's continued competitiveness in nuclear science through provision of unprecedented discovery potential. FRIB was technically completed in January 2022, on budget and ahead of the planned project completion (Critical Decision 4) in June 2022. User experiments commenced 9 May 2022. FRIB hosts scientists who conduct experiments, extend the frontier of nuclear science, and help define the next frontier and the next reinvention needed to reach and transcend it.

History of the FRIB/NSCL Laboratory

The development of Michigan State's prowess in nuclear physics began when MSU's legendary President John A. Hannah seized upon the idea that developing a major program in physics could be a cornerstone of his strategy for growth and diversification of the university. His emerging idea took a major step toward reality when, in 1958, a young man named Henry Blosser came to MSU to build a uniquely powerful cyclotron.

Blosser—an ambitious visionary with determination, leadership skills, and theoretical and technical expertise—assembled a remarkable team, and together they succeeded in designing, building, and funding MSU's first cyclotron, the K50, completed in 1965 and used for nuclear physics research with proton beams.

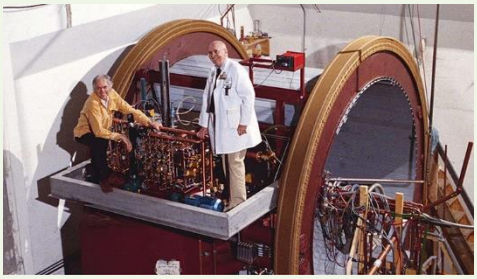
Thus was launched a tradition not only of academic excellence in nuclear physics but of visionary anticipation and response to the quickly advancing frontiers of nuclear science. While 1965-1979 was the K50 era at MSU, by 1973 Blosser and his team were already envisioning what would be required next. They soon

Learn more at frib.msu.edu

Laboratory History

1961
MSU Cyclotron Laboratory

1977
MSU/NSF Heavy Ion Laboratory



1980
National Superconducting Cyclotron Laboratory (NSCL)

2022
Facility for Rare Isotope Beams (FRIB)

began working on acquiring funding, designing, and preparing to build a superconducting magnet, which was the cornerstone for the next generation cyclotron, the K500.

Funded by NSF, completion of the K500 in 1982 initiated the superconducting cyclotron era, and the MSU Cyclotron Laboratory became a national user facility for research with heavy ions.

Long before the K500 was complete, the team was planning the next generation, a coupled superconducting cyclotron system which would add a K1200 post-accelerator to the K500.

Their proposal was selected in 1978 by the newly created NSAC to NSF and DOE for development as NSCL. The K1200 was completed in 1988 and by 1990 was operating with the A1200 fragment separator to produce beams of rare isotopes through in-flight fragmentation of heavy-ion beams. Plans were already in motion that led in 2001 to the coupled cyclotron facility with the A1900 fragment separator—the world's most powerful rare isotope facility.

At FRIB, rare-isotopes beams are produced and separated in-flight, and subsequently thermalized and reaccelerated to energies up to 10 MeV/u, by the ReAccelerator facilities ReA3 and ReA6, a worldwide unique, state-of-the-art accelerator for rare-isotope beams. FRIB provides the highest possible intensity rare isotope beams as input to the ReA facility.

MSU Reputation

MSU is a member of the Association of American Universities, an organization of 71 American research universities; ranks 24th among public universities in the 2023 Forbes "America's Top Colleges" ranking; ranks 28th among public universities and 60th overall out of nearly 1,500 United States colleges and universities in the 2024 U.S. News & World Report "Best National Universities" ranking; ranks 116th out of nearly 1,800 universities in the world in the Times Higher Education World University Rankings 2024; and ranks 116th out of 2,000 universities in the 2023 U.S. News & World Report "Best Global Universities" ranking. MSU's nuclear physics graduate program is a top-ranked program nationally, according to U.S. News & World Report.

Progression of Experimental Capability at MSU

1965
K50 (cyclotron for protons)

1977
Superconducting magnet

1982
K500 (superconducting cyclotron for heavy ions)

1988
K1200 (superconducting cyclotron for heavy ions)

1990
A1200 beams (in-flight separated rare isotopes)

2001
Coupled cyclotron facility (the most powerful rare isotope facility until 2007)

2005
LEBIT – Low Energy Beam and Ion Trap (stopped rare isotopes)

2014
ReA3 (reaccelerated rare isotopes)

2021
ReA6 (reaccelerated rare isotopes)

2022
FRIB (fast, stopped, reaccelerated rare isotopes)

MICHIGAN STATE UNIVERSITY
U.S. DEPARTMENT OF ENERGY | Office of Science
FRIB