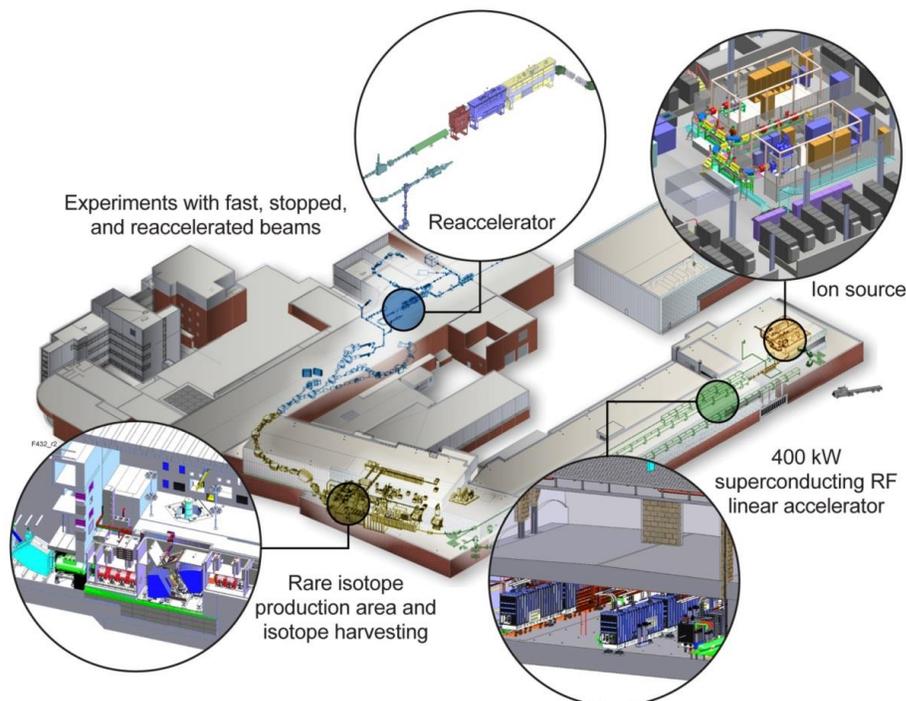


# Facility for Rare Isotope Beams (FRIB)

March 2015



- **FRIB is a future U.S. Department of Energy Office of Science (DOE-SC) scientific user facility designed to produce the widest range of isotopes for scientific research, including thousands of isotopes not yet observed on Earth**
- **What is a rare isotope?**
  - When neutrons are removed from or added to the nucleus of a stable atom and it becomes unstable against decay, it is a rare isotope. Most rare isotopes are not normally found on earth anymore.
  - Rare isotopes are forged in spectacular cosmic processes and in rare isotope accelerators, of which FRIB will be the most powerful and capable of producing the widest range of possible isotopes for nuclear scientists to study.
- **FRIB science is of strategic importance for the United States**
  - Essential for maintaining leadership in fundamental nuclear science research; for understanding the existence of atomic nuclei, how the elements were formed; and for understanding the life cycles of stars
  - Essential for developing new applications of rare isotopes in homeland security, non-proliferation, stockpile stewardship, medicine, biology, materials, energy, and environmental fields
- **FRIB will be a DOE-SC facility established and operated by Michigan State University**
  - Civil and technical construction have started and civil construction is eight weeks ahead of schedule
  - FRIB completion is scheduled for 2022, but the project team is managing to early completion in 2020
  - Appropriation of baseline funding profile necessary to remain on cost and schedule



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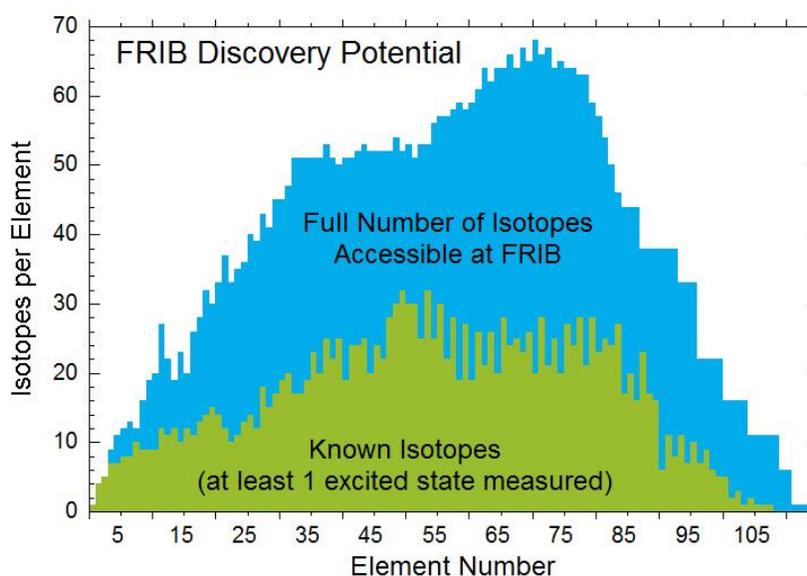


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- **FRIB is cost-effective and being established under a Cooperative Agreement**
  - Baselined cost is \$730M of which MSU shares \$94.5M
  - Additional MSU contributions of \$300M result in an FRIB Laboratory worth over \$900M
  - Designed to efficiently accommodate incremental science-driven upgrades
- **FRIB is a high priority of the U.S. science community**
  - Priority for completion in the 2013 report *Implementing the 2007 Long Range Plan* by the DOE/NSF Nuclear Science Advisory Committee
  - First recommendation in the 2012 National Academies Decadal Study of Nuclear Physics: *Nuclear Physics: Exploring the Heart of the Matter*
- **As a campus-based user facility, FRIB will attract and train the next generation of nuclear scientists necessary for maintaining U.S. lead in science and technology**
  - University environment provides hand-on training and interaction of students with world-leading scientists on a daily basis
  - MSU has the nation's top-ranked nuclear physics graduate program and grants more than 10% of the nation's nuclear physics PhDs
  - FRIB Laboratory employs approximately 200 students throughout the year
- **1400 FRIB users include members from 35 U.S. states, 92 colleges and universities, 10 national laboratories, and 51 countries (fribusers.org)**



FRIB will more than double (represented in blue in graph above) our knowledge (green) of the properties of nuclei – the race to stake new claims in the rare isotope frontier is on. In the coming decade, greater nuclear science accomplishments and benefits will come at a faster pace as new technologies in accelerators, experimental instrumentation, and computing will allow scientists to penetrate and explore the vast frontier of isotopes that in the past were inaccessible to human investigation.

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