HRIBF
Holifield Radioactive Ion Beam Facility

A leading international facility with unique capabilities for research in nuclear structure and nuclear astrophysics using beams of short-lived nuclei

The Holifield Radioactive Ion Beam Facility (HRIBF) at Oak Ridge National Laboratory is a major U.S. facility running a dedicated user program in nuclear physics using exotic beams. Radioactive species are produced by intense light-ion beams from the Oak Ridge Isochronous Cyclotron and post-accelerated by the 25 MV tandem, the world's highest voltage electrostatic accelerator. The radioactive-ion-beam injector system links production and postacceleration. More than 175 isotopes can be accelerated and approximately 30 additional species are available as low-energy (~50 keV) beams. More than 60 post-accelerated beams, including ^{132}Sn, have intensities of at least 10^6/s. The ability of HRIBF to deliver beams of reaccelerated beams of neutron-rich fission fragments at energies above the Coulomb barrier is unique worldwide. A program is underway to substantially improve HRIBF performance.

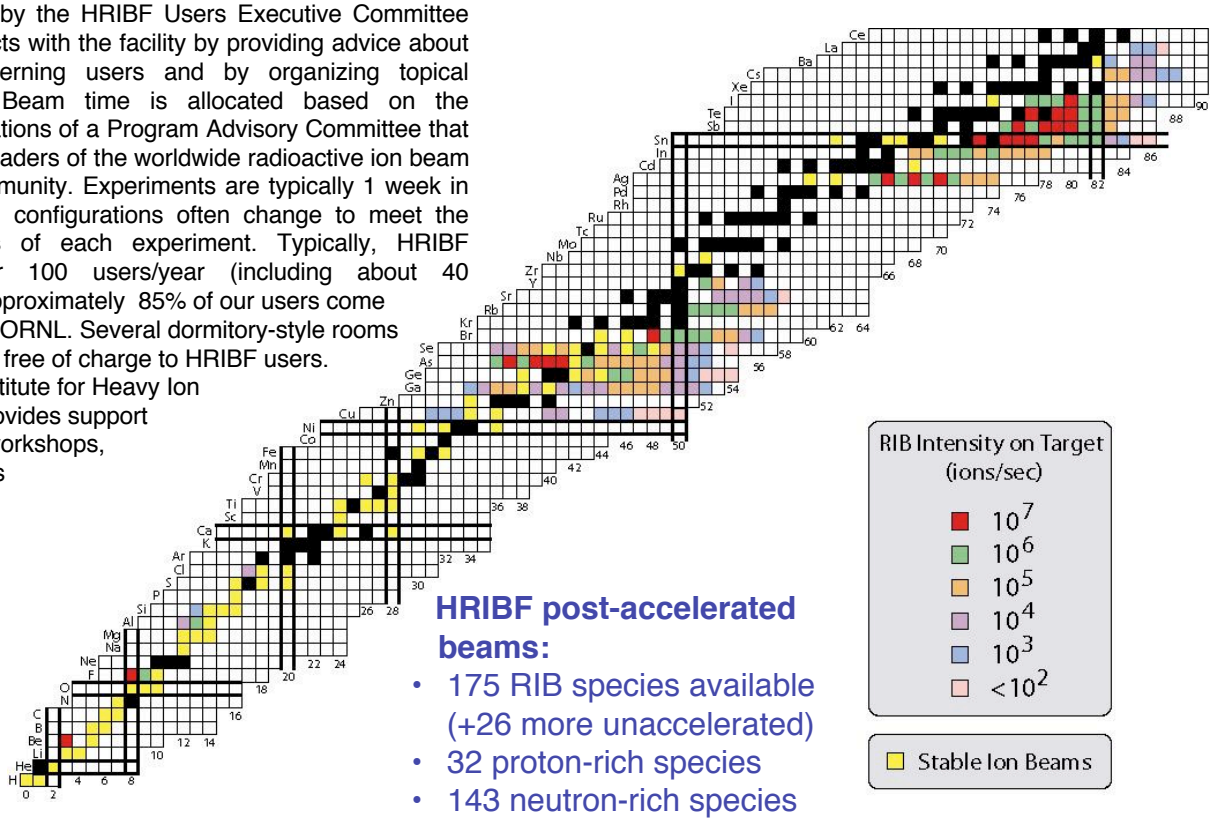
User Community

HRIBF serves a large community of nuclear scientists. The HRIBF Users Group has more than 500 members from 167 institutions and 34 countries. The users are represented by the HRIBF Users Executive Committee which interacts with the facility by providing advice about issues concerning users and by organizing topical workshops. Beam time is allocated based on the recommendations of a Program Advisory Committee that consists of leaders of the worldwide radioactive ion beam science community. Experiments are typically 1 week in duration and configurations often change to meet the requirements of each experiment. Typically, HRIBF serves over 100 users/year (including about 40 students). Approximately 85% of our users come from outside ORNL. Several dormitory-style rooms are available free of charge to HRIBF users. The Joint Institute for Heavy Ion Research provides support for visitors, workshops, and meetings

Research Directions

Nuclear structure and reaction research at HRIBF provides insight into the nature of the force that clusters protons and neutrons into a nucleus. HRIBF tests the limits of nuclear stability using intense beams above the Coulomb barrier and new techniques for detecting the shortest-lived, proton-rich nuclei. The unique capabilities of HRIBF allow the determination of how rapidly some isotopes are created in stellar explosions, and how quickly they may be destroyed. The questions that HRIBF tries to answer are the major questions that drive the field of low-energy nuclear physics:

- How do protons and neutrons make stable nuclei and rare isotopes?
- What is the origin of simple patterns in complex nuclei?
- What are the heaviest nuclei that can exist?
- When and how did the elements from iron to uranium originate?
- How do stars explode?
- What is the nature of neutron star matter?
- How can our knowledge of nuclei and our ability to produce them benefit the humankind?



HRIBF post-accelerated beams:

- 175 RIB species available (+26 more unaccelerated)
- 32 proton-rich species
- 143 neutron-rich species

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