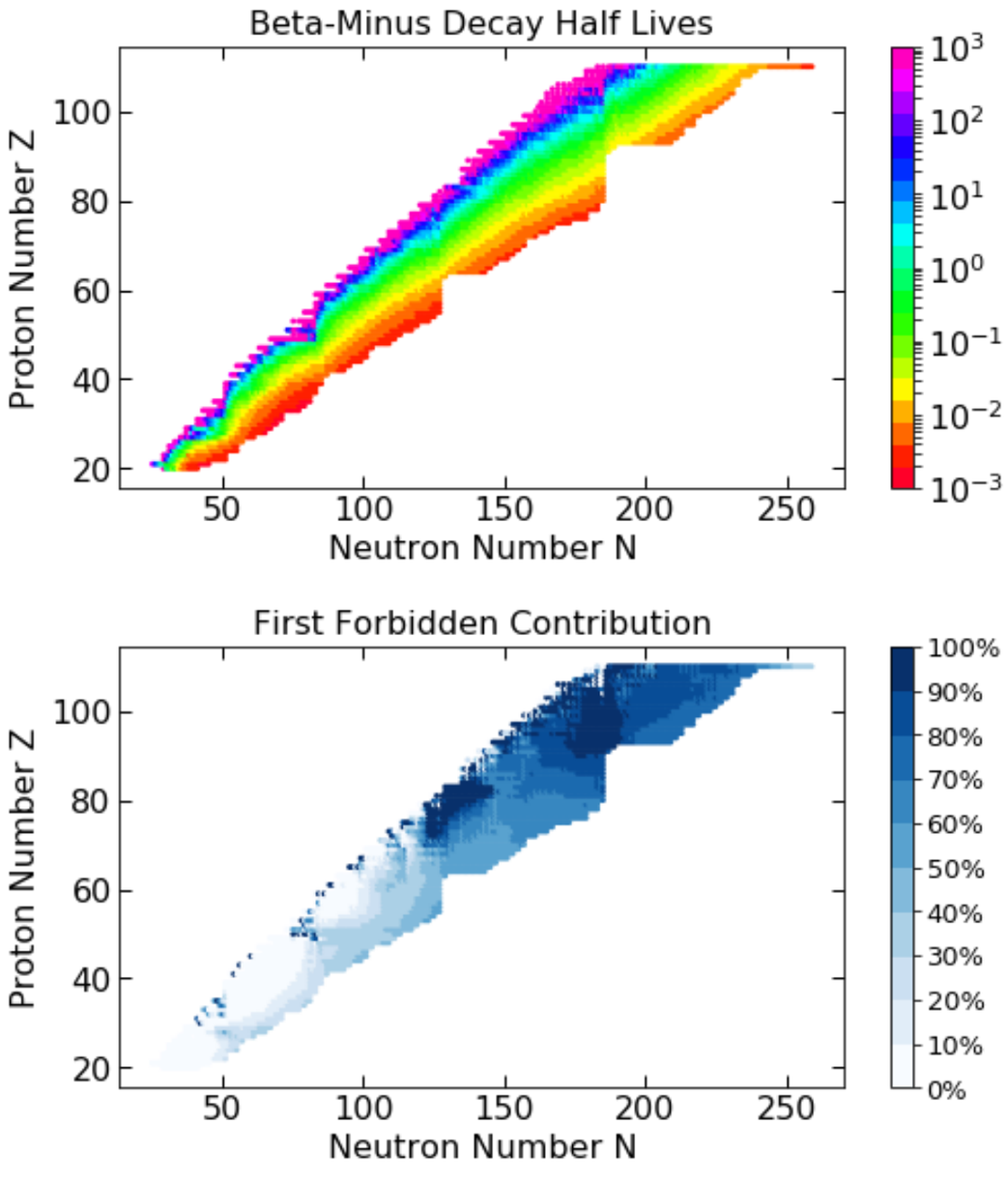
U.S. DEPARTMENT OF ENERGY | Office of Science

Computing Beta Decay Everywhere

NUCLEI Nuclear Computational Low-Energy Initiative

Objectives

- Develop a self-consistent microscopic framework for computing beta decay in odd-A and odd-odd isotopes.
- Extend existing computational methods to speed up beta decay calculations in odd isotopes.
- Compute beta decay rates in all nuclei, and particularly in exotic nuclei beyond experimental reach.



Impact

- Improved r-process simulations.
- Ability to better constrain energy density functionals.
- Robust and user-friendly interface for large scale beta decay calculations.

Accomplishments

1. Developed and implemented a low-cost way to apply the Skyrme QRPA (and finite-amplitude-method) to charge-changing transitions in odd-A and odd-odd nuclei.
2. Created a unified python interface (PyNFAM) for large scale parallelized beta-decay rate and strength function calculations.
3. Calculated beta decay in all nuclei on the neutron-rich side of the valley of stability, out to the neutron drip line.