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Facility for Rare Isotope Beams: Never the Same Beam Twice

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The Facility for Rare Isotope Beams (FRIB) –a world-leading laboratory for providing exotic beams –is entering its third year of user operation. The facility produces rare-isotope beams through in-flight fragmentation of high-power beams of stable heavy-ion isotopes ranging from oxygen to uranium and at energies up to 200 MeV per nucleon. This year the facility will double its primary beam power from 10 to 20 kW on its multi-year ramp-up path to 400 kW.

The fact that beam conditions constantly change is a defining characteristic of the facility. Each rare-isotope setting usually requires a unique combination of three primary beam parameters: isotope, energy, and power. The variability among these parameters is even more dramatic for the resulting rare-isotope beams, along with the added complication of a large range of beam loss scenarios along the fragment separator depending on its setting required to produce a specific isotope. A final parameter contributing to the variability of beam conditions is the final beam destination, with each end-station having its unique circumstances.

This work gives a sampling of recent simulations by the FRIB radiation transport team to support the facility. The examples highlight the challenges and strategies involved for an accelerator complex that mixes and matches multiple components to make beams –one where the beam conditions almost never repeat.

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Scientific Topic 1

Source terms, new accelerator facilities and related topics

Scientific Topic 2

Scientific Topic 3

Scientific Topic 4

Shielding and dosimetry

Scientific Topic 5

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