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Opportunities for Isotope Discovery at FRIB

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The discovery of an isotope is not only a prerequisite for the future investigation of its nuclear structure, but it also helps us to delineate the limits of nuclear binding and thus has direct implications for fundamental questions in nuclear physics and nuclear astrophysics. Besides the roughly 300 stable isotopes there are about 2700 that have been identified so far, but there are still several thousand to be discovered [1]. Isotope discoveries are closely linked to the experimental equipment available, and for rare isotope beams this means that a new generation of accelerator facility offers opportunities for discovery.

With its high intensity primary beam of 200 MeV/u and 400 kW, FRIB will make a large number of rare isotopes available for the first time. Besides offering the needed particle yields, the 3-stage fragment separator ARIS [2] will also provide the selectivity that is required to identify these very rare isotopes.

Expected production yields for a wide range of rare isotopes were calculated using the the code LISE++ and planned performance parameters [3, 4]. A comparison between recent isotope discoveries and expected particle yields indicates the range of isotopes that can likely be detected. The presentation will highlight recent isotope discoveries at NSCL's Coupled Cyclotron Facility and deduce how far the limits can be pushed with the Facility for Rare Isotope Beams.

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