

Overview of Isotope Harvesting Efforts at FRIB

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At the Facility for Rare Isotope Beams (FRIB), exotic secondary beams are created by the fragmentation of a high-power primary beam. In this process only a small fraction of the beam products are selected and co-produced fragments are intercepted by accelerator components, while the unreacted primary beam will be stopped in a water-traversed beam dump. The accumulated radionuclides in all these components represent an invaluable resource and can be collected through targeted isotope harvesting.

I will give an overview of the aqueous isotope harvesting process, focusing on the collection of ^{62}Zn from a stopped ^{78}Kr beam. The ^{62}Zn decays to the short-lived ^{62}Cu ($t_{1/2} = 9.7$ min) and currently, both find collective application in nuclear medicine for the $^{62}\text{Zn}/^{62}\text{Cu}$ PET generator. The developed purification method facilitated the successful isolation of ^{62}Zn . Furthermore, we have started to develop the chemistry required to set up a $^{62}\text{Zn}/^{62}\text{Cu}$ generator.

Isotope collection from the solid phase is another possible isotope harvesting mode. Recently, we have begun exploring the radioisotopes ^{189}Pt and ^{197}Pt , which are relevant for nuclear medicine, especially in the form of radio-cisplatin. We developed a separation process to extract Pt from the collector material and impurities. Preparations are underway for a beam experiment to isolate the Pt radioisotopes and validate our method with radioactive materials.

Isotope harvesting is generally non-selective towards the production of a particular isotope, often yielding mixed samples rather than radioisotopically pure ones. Introducing a mass-separation step could expand the availability of pure isotopes. FRIB's infrastructure includes a suitable mass analyzer, enabling the development of a prototype mass separator. This talk will overview our initial mass-separation experiment where we investigated the release and extraction of stable ^{61}Ni , and provide an outlook on possible extensions to the isotope harvesting program.