

Isotope Harvesting at FRIB

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Inside the high-power beamstop at FRIB, nuclear reactions between the fast heavy-ion beam and water will create a large number of by-product radionuclides. Many of them are valuable for applied and basic-science research if they can be efficiently recovered from the beamstop water. We are currently designing and testing the systems that will allow collection and purification of these radionuclides, and one major concern is that many of the envisioned processes will be influenced by the unique radiolysis environment inside of the cooling system. Varied redox potentials and a pulsed time-dependent pH in the cooling water will potentially lead to unpredictable speciation of aqueous ions and the inclusion of corrosion products. Meanwhile the sensitivity of the cooling system to chemical alterations precludes intervention, except to maintain the physical integrity of the cooling system components. Despite the challenges, preliminary testing at the NSCL shows that harvesting is feasible and is an important path towards obtaining the unique radionuclides created by heavy-ion interactions with water.

Primary author: Dr SEVERIN, Gregory (Facility for Rare Isotope Beams)

Presenter: Dr SEVERIN, Gregory (Facility for Rare Isotope Beams)

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