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(I) Exotic Nuclear Decay at the Limits of Stability

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Studies of atomic nuclei furthest from stability often reveal surprising phenomena such as exotic structures, highly-deformed shapes and rare modes of radioactive decay. Understanding the properties of the most exotic nuclei is crucial for constraining nuclear reaction rates in explosive astrophysical scenarios and explaining the elemental abundances of the stable and radioactive isotopes that they eject into the universe. These studies pose a significant experimental challenge that requires powerful rare-isotope production and accelerator facilities coupled with state-of-the-art detection systems. In this presentation, I will describe some of the more exotic modes of radioactivity that are relevant in neutron-deficient nuclei, what they can tell us about nucleosynthesis and I will present a novel detector called the Regina Cube for Multiple Particles that was designed and built at the University of Regina for experiments at TRIUMF with the GRIFFIN spectrometer.

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