Nuclear Seminar

Ion Traps for Astrophysics

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Room 124 Nieuwland Science Hall

The astrophysical r process is thought to be responsible for the creation of half of the elements heavier than iron. In an attempt to reproduce the observed distribution of element abundances in the universe, models are generated which inherently rely upon many nuclear physics inputs, including the masses of the nuclides involved and their beta-decay properties. However, the uncertainties in these nuclide properties are often too large and limit our understanding of heavy-element nucleosynthesis, yet more precise measurements of these properties are difficult to obtain since a large number of the nuclides involved in the astrophysical r process are often too challenging to produce at accelerator facilities. Recently the CARIBU facility, an upgrade to Argonne National Laboratory's ATLAS facility, has started to provide intense beams of a number of these previously elusive neutron-rich nuclei. A program of mass measurements at CARIBU is now underway with the Canadian Penning trap mass spectrometer. In addition, a specially designed ion trap is currently being developed to facilitate a new program of beta-decay spectroscopy using nuclides produced by CARIBU. This new technique of using ion traps to perform beta-decay studies could significantly advance the field, just as ion traps had done in the field of mass spectroscopy. The ion trapping techniques and the results/implications of some of the first measurements will be presented.