Physics Colloquium

New facilities and techniques to access r-process nuclei

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WEDNESDAY

JANUARY 20

4:00 P.M.

RM 118 NSH

The r-process, a series of rapid neutron-capture reactions in cataclysmic astrophysical events, is responsible for the creation of roughly half of the heavy nuclei in our universe. This process proceeds mainly through reactions on short-lived very neutron-rich nuclei that are either very poorly known or have never been observed in the laboratory. At ANL, a program centered around the ATLAS facility is aimed at improving access to these nuclei and developing the tools to measure the most critical quantities to constrain r-process scenarios.

The recent CAlifornium Rare Ion Breeder (CARIBU) Upgrade facility now provides access to neutron-rich nuclei around the N=82 neutron shell closure which are critical to understand the r-process. Improved measurement techniques using ion traps have also been developed and/or improved to measure masses, lifetimes and decay properties to the required precision for these nuclei. While the measurements in this region are being completed, it has been highlighted by r-process sensitivity studies that another region of high interest is the neutron-rich region "east" of 208Pb which is a particularly sensitive probe for the N=126 abundance peak. This region has proven to be very difficult to access so far. To mitigate the situation we are building a new facility, the N=126 factory, which will use a different production mechanism to access this region.

The basic nuclear physics inputs required to understand the r-process will be presented, together with the existing ATLAS and CARIBU facilities, recent measurements and an overview of the N=126 factory currently under construction.

Refreshments
in Rm 202 NSH
@ 3:30 pm

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