



PHYSICS AND ASTRONOMY SEMINAR

Dr. Iris Dillmann

TRIUMF

“Beta-Delayed Neutron Emission and its Role in the R- Process”

Abstract

Beta-delayed neutron- (βn -) emitters play an important, two-fold role in the stellar nucleosynthesis of heavy elements in the "rapid neutron-capture process" (r process). On one hand they lead to a detour of the material beta-decaying back to stability. On the other hand, the released neutrons increase the neutron-to-seed ratio, and are re-captured during the freeze-out phase and thus influence the final solar r-abundance curve.

A large fraction of the isotopes for r-process nucleosynthesis are not yet experimentally accessible and are located in the "terra incognita". With the next generation of fragmentation and ISOL facilities presently being built or already in operation, one of the main motivation of all projects is the investigation of very neutron-rich isotopes at and beyond the border of presently known nuclei. However, reaching more neutron-rich isotopes means also that multiple neutron-emission becomes the dominant decay mechanism.

The investigation of βn -emitters has recently experienced a renaissance. I will show some recent results from a GSI campaign with the BELEN detector, and introduce the program planned for 2015/16 at RIKEN with the "BRIKEN" detector. "BRIKEN" ("*Beta-delayed neutron measurements at RIKEN for nuclear structure, astrophysics, and applications*") is a worldwide effort which combines ^3He -neutron counters from groups in Germany, Japan, Russia, Spain, and the USA and the implantation detector AIDA from the UK to the presently largest and most efficient neutron detection setup.

In parallel to these activities, the International Atomic Energy Agency (IAEA) has recently approved a Coordinated Research Project about "Beta-Delayed Neutron Emission Evaluation" to create a solid basis for the vast amount of new neutron-rich isotopes being discovered with the new generation of RIB-facilities in the next decades.

Monday, December 8, 2014

11:00 a.m.

Elliott Building

Room 162