ABSTRACT FOR SEMINAR BY JOHN WEIDNER

To be given at 9:00 am on Friday, April 20th

Measurement of ^{225}Ac and ^{223}Ra Production Cross Sections and Thermal-Hydraulic Modeling of a RbCl/Ga Target Stack

Cross sections for the formation of ^{223,225}Ra, ^{225}Ac and ^{227}Th by the proton bombardment of natural thorium targets were measured at proton energies of 800 MeV and below 200 MeV. The production cross section for ^{227}Ac was also measured at 800 MeV. No earlier experimental cross section data for the production of ^{223,225}Ra, ^{227}Ac and ^{227}Th at 800 MeV by this method were found in the literature. For proton energies below 200 MeV, the measurements of this work are in good agreement with previously published data and offer a complete excitation function for ^{223,225}Ra in the proton energy range of 90-200 MeV. A comparison of theoretical predictions with the experimental data generally shows factor of two agreement. Results indicate that accelerator-based production of ^{225}Ac and ^{223}Ra at 800 MeV and below 200 MeV is a viable production method capable of increasing current annual yield by nearly two orders of magnitude.

Additionally, a thermal-hydraulic model of a RbCl and Ga target stack, which is used for routine production of the PET isotopes ^{82}Sr and ^{68}Ge at Los Alamos, was created using ANSYS CFX. This model simulates the *in-situ* temperature profile and buoyant convective fluid flow of the targets while subject to intense 100 MeV proton beams. The CFX model provides a foundation for additional and more expansive parameter sensitivity studies by the Los Alamos isotope production team as they seek to increase PET isotope production yields in the near term.