

Abstract Submitted
for the CAL11 Meeting of
The American Physical Society

Beta-delayed neutron spectroscopy using trapped radioactive ions RYAN YEE, UCB/LLNL, N.D. SCIELZO, LLNL, P.F. BERTONE, ANL, F. BUCHINGER, McGill U, S. CALDWELL, UChicago/ANL, J.A. CLARK, C.M. DEIBEL, J. FALLIS, ANL, G. LI, McGill U/ANL, S. GULICK, McGill U, D. LAS-CAR, Northwestern U/ANL, A.F. LEVAND, ANL, E.B. NORMAN, UCB/LLNL, M. PEDRETTI, LLNL, G. SAVARD, UChicago/ANL, R.E. SEGEL, Northwestern U/ANL, K.S. SHARMA, UManitoba, M.G. STERNBERG, J. VAN SCHELT, UChicago/ANL, B.J. ZABRANSKY, ANL — The properties of beta-delayed neutron emission are of interest to both the basic and applied nuclear physics communities. For example, branching ratios are needed to determine how the short-lived neutron-rich isotopes synthesized in the astrophysical r process decay back to stability to become the isotopes we observe today. Also, neutron energy spectra and branching ratios are required for the design of nuclear reactors. Reliable measurements of the beta-delayed neutron properties can be performed with unprecedented precision using an ion trap surrounded by radiation detectors. When a radioactive ion decays in the trap, the recoil-daughter nucleus and emitted particles emerge from the $\sim 1 \text{ mm}^3$ trap volume with minimal scattering. These properties allow the momentum and energy of the emitted neutron to be precisely reconstructed from the nuclear recoil. Spectroscopy of beta-delayed neutrons can be performed with high efficiency, energy resolutions approaching $\sim 3\%$, and virtually no background. Results from a recent proof-of-principle experiment will be discussed. Prepared by LLNL under Contract DE-AC52-07NA27344 and ANL under Contract DE-AC02-06CH11357.

Ryan Yee
UC Berkeley/Lawrence Livermore National Laboratory

Date submitted: 29 Sep 2011

Electronic form version 1.4