Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

A direct measurement of the ^{6}Li(n,t)^{4}He cross section at sub-thermal neutron energy A. YUE, M. DEWEY, D. GILLIAM, J. NICO, National Institute of Standards and Technology, G. GREENE, University of Tennessee / Oak Ridge National Laboratory, A. LAPTEV, Los Alamos National Laboratory — The thermal neutron capture cross section for the ^{6}Li(n,t)^{4}He reaction is an important neutron cross section standard. Yet few measurements of it have been performed and the ENDF/B-VII recommended value of (938.5 ± 1.3) b is based heavily on measurements performed at higher energies. The first absolute, direct measurement of the ^{6}Li(n,t)^{4}He cross section at sub-thermal neutron energy has been performed at the NIST Center for Neutron Research. An alpha-gamma counter was used to measure the absolute neutron fluence of a monoenergetic neutron beam to sub-0.1 % precision. The alpha-gamma counter used a thick, totally absorbing target of ^{10}B-enriched boron carbide. The rate of absorbed neutrons was determined by counting the 478 keV ^{10}B(n,γ)^{7}Li gamma rays with calibrated high-purity germanium detectors. Simultaneously, the absolute rate of neutron-induced charged particles was measured for three thin ^{6}Li targets of known density with a defined solid-angle counter. Using the known density of the ^{6}Li targets and measurements of the rate of charged particles from the ^{6}Li targets, the fluence of the neutron beam, and the energy of the neutron beam, we determine the ^{6}Li(n,t)^{4}He cross section at $E_n = 3.3$ meV to 0.3 % uncertainty.

Andrew Yue
National Institute of Standards and Technology

Date submitted: 01 Jul 2014 Electronic form version 1.4