Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

Capture-Gated Fast Neutron Spectroscopy H.P. MUMM, NIST - Natl Inst of Stds & Tech, J.N. ABDURASHITOV, Institute for Nuclear Research of the Russian Academy of Sciences, E.J. BEISE, H. BREUER, University of Maryland, V.N. GAVRIN, Institute for Nuclear Research of the Russian Academy of Sciences, C.R. HEIMBACH, NIST - Natl Inst of Stds & Tech, T.J. LANGFORD, Yale University, M. MENDENHALL, J.S. NICO, NIST - Natl Inst of Stds & Tech, A.A. SHIKHIN, Institute for Nuclear Research of the Russian Academy of Sciences — We present recent developments in fast neutron detection using segmented spectrometers based on the principle of capture-gating. Our approach employs an organic scintillator to detect fast neutrons through their recoil interaction with protons in the scintillator. The neutrons that thermalize and are captured produce a signal indicating that the event was due to a neutron recoil and that the full energy of the neutron was deposited. The delayed neutron capture also serves to discriminate against uncorrelated background events. The segmentation permits reconstruction of the initial neutron energy despite the nonlinear response of the scintillator. We have constructed spectrometers using both He-3 proportional counters and Li-6 doping as capture agents in plastic and liquid organic scintillators. We discuss the operation of the spectrometers for the measurement of low levels of fast neutrons for several applications, including the detection of very low-activity neutron sources and the characterization of the flux and spectrum of fast neutrons at the Earth's surface and in the underground environment.

Hans Mumm
NIST - Natl Inst of Stds & Tech

Date submitted: 01 Jul 2015 Electronic form version 1.4