

Abstract Submitted
for the 4CF12 Meeting of
The American Physical Society

A Neutron Detector Constructed Using Shards of ^6Li -loaded Glass Scintillator STEVEN GARDINER, Los Alamos National Laboratory, BART CZIRR, LAWRENCE REES, Brigham Young University — Because of a global shortage of ^3He , an essential component of many neutron detectors, much work is currently being done to develop new neutron detectors based on alternative materials for homeland security applications. One of the possible replacements for ^3He is Ce^{3+} -activated, ^6Li -loaded glass scintillator. Although this material has been widely used in neutron detectors for over half a century, its relatively high gamma sensitivity has made it unattractive for use in radiation portal monitors. We have tested a new technique for reducing the gamma sensitivity of a neutron detector based on ^6Li glass. Our prototype neutron detector consists of small (about 1 mm^3) shards of ^6Li -loaded glass scintillator embedded in optical epoxy. Mineral oil is placed behind the glass and epoxy for moderation. Our tests indicate that this detector can achieve a gamma sensitivity that is at least 100 times lower than a comparable neutron detector constructed using a thin sheet of ^6Li glass. Modeling performed using the particle transport codes MCNP and PENELOPE suggests that the gamma sensitivity of the glass shards is lower because more high-energy Compton electrons escape them before depositing their full energy.

Steven Gardiner
Los Alamos National Laboratory

Date submitted: 21 Sep 2012

Electronic form version 1.4