

## Public Abstract

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Title:Modeling and Analysis of a Portable, Solid-State Neutron Detection System for Spectroscopic Applications

This paper discusses a new neutron detection system that allows local volumetric identification of fast neutron thermalization in the context of forming a solid state Bonner-like neutron spectrometer. The resulting departure and subsequent improvement from the classical Bonner spectrometer is that the entire moderating volume is sampled locally for thermal neutrons. Such volumetric resolution is possible through the layering of weakly perturbing and pixilated high thermal efficiency solid state neutron detectors into a cylindrically symmetric neutron moderator. The overall system exhibits >10% total detection efficiency over the neutron energy range from thermal to 20 MeV and the data can be acquired simultaneously from all detector elements in a single measurement. These measurements can be used to infer information on incident neutron energy spectra and direction, which provides capabilities not available in current systems. The end result is a highly efficient, man-portable device with significantly improved methods for determination of pervading neutron energy spectra and the corresponding dose equivalent.