Abstract

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A Palm-Sized Adaptive Neutron Scatter Camera

An adaptive, palm-sized neutron scatter camera composed of organic glass scintillating cubes coupled to a silicon photomultiplier (SiPM) array is examined in simulation space. Neutron scatter cameras reconstruct probability distributions, or cones, of incident neutron directions using classical kinematics of double-scatter events. Confining all active detector volumes to a single plane also confines the neutron flight paths, and therefore the axes of cones to this plane and causes artifacts in image reconstruction. The artifacts are eliminated in this scatter camera by introducing another degree of freedom: mechanical rotation. Additional neutron flight paths can be accessed by physically rotating the detector plane relative to the source, thereby allowing a continuous variety of cones and eliminating image artifacts. The efficacy of such a system is demonstrated in this work using MCNPX-PoliMi.