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Evaluation of a lithium-glass based composite neutron detector for ^3He replacement GRAYSON RICH, Lawrence Livermore National Laboratory and the University of North Carolina at Chapel Hill, KAREEM KAZKAZ, H. PAUL MARTINEZ, Lawrence Livermore National Laboratory — In light of the reduction of the world's supply of helium-3 and the increasing demand for neutron detection in the fields of physics research, national security, and nuclear energy, the need for a suitable alternative to ^3He -based detector technology is of paramount importance. It is critical that a potential replacement boast both high neutron detection efficiency and insensitivity to, or the ability to discriminate against, gamma-ray backgrounds. Recent efforts investigating the use of composite detectors, specifically highly neutron-sensitive scintillators embedded in scintillating acrylic, have shown promise but need further improvements to be competitive with moderated helium-3 tubes. Endeavoring to increase the neutron detection efficiency over composite detectors of earlier efforts, we have fabricated a 5" x 5" cylindrical detector of polyvinyltoluene embedded with 1.5-mm lithium-glass cubes composing 10% of the total mass. The results of both simulations and experiments comparing our Li-glass based composite detector to other composite technologies and to ^3He are presented. Prepared by LLNL under Contract DE-AC52-07NA27344. LLNL-ABS-XXXXXX.

Grayson Rich
Lawrence Livermore National Laboratory and
the University of North Carolina at Chapel Hill

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