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Fast Neutron and Gamma-ray Detection with Liquid-Xe Detector for Contraband Detection

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We have investigated the possibility of using a liquid Xe (LXe) detector for combined imaging and spectroscopy of neutrons and gamma-rays in the MeV range. This activity is part of the R&D work on LXe detectors performed at WIS for the search of dark matter.

Our aim is a detection of hidden explosives and fissile materials in cargo and containers using fast neutrons resonant transmission radiography and high energy dual discrete gamma-ray radiography. The detector consists of a fast liquid-xenon (LXe) converter-scintillator coupled to a UV-sensitive gaseous imaging photomultiplier (GPM) made of a cascaded Thick-Gas Electron Multipliers (THGEMs) of which the first one is coated with a CsI photocathode.

Simulation study and experimental results of the GPM performance in combination with a LXe converter will be presented and the cryogenic experimental system for radiographic investigations with neutrons and gammas will be described.

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