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Contrabands Detection with a Low Energy Electron Linac Driven Photoneutron Source

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A low energy electron linac driven photoneutron source, which can provide both X-rays and photoneutrons simultaneously in the same system, is realized to interrogate contrabands concealed in luggage or cargoes. X-rays produced by the 7 MeV electrons that bombard the tungsten target are used to penetrate the inspected material and form the 2-dimensional mass thickness image. Photoneutrons, which are the byproduct of X-rays, can be used to penetrate the inspected materials to form the neutron image. The fusion of X-ray image and photoneutron image is helpful for the separation of organic materials, light metals, medium-weight metals and heavy metals. The (γ ,fission) induced beta-delayed neutrons in the heavy metal indicates the possible existence of the special nuclear material. Photoneutrons within the eV energy range can then be used to penetrate the heavy metal in order to identify its isotopic concentration, if it is suspected as the special nuclear material. The thermalized neutron can also induce the prompt gamma-rays in the inspected material, the detection of which provides the fingerprint information of special nuclides, which in turn helps the detection of explosives or drugs. This system can be held in a truck, and hence is a mobile system that can provide in-situ contrabands detection abilities.

Keyword: contrabands detection; photoneutron; explosives; drugs; special nuclear material;

Country/Organization invited to participate

China

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