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Plastic Scintillator-based Radiation Detector for Mobile Radiation Detection System against Nuclear/Radiological Terror

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In these days, the threats relating to nuclear and radioactive materials have become a matter of internationally increased grave concern. The mobile radiation detection system has employed a NaI-based radiation detector to monitor in-transit nuclear material. In the design of a radiation detector for prevention of illicit trafficking of nuclear and radioactive materials, the trade-off should be carefully optimized between performance and cost to achieve cost-effective inspection system. The cost-effective mobile radiation detection system based on plastic scintillation material is introduced in this paper. This paper also deals with six energy windowing approach to discriminate any targeted materials (SNM, radioactive source) from nationally occurring radioactive material (NORM). For energy windowing approach, placement of each energy window boundary and its statistical radio are characterized by using MCNPX. The theoretical results are corrected with systematic noise obtained through experiment. Finally, this paper demonstrates how the mobile radiation detection system succeeds in detecting the targeted materials and discriminating them from NORM.

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