

Detection of special nuclear material for the purpose of nuclear safeguards

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Efficient and reliable detection of special nuclear material, such as ^{233}U , ^{235}U , ^{240}Pu and ^{239}Pu , is crucial for safeguards and for preventing illegal spreading of nuclear materials.

The spontaneous fission of ^{239}Pu results in the creation of several prompt photons and neutrons with known energy distributions. Time correlations between the detection of these particles can then be used to identify such fissions. For this reason, passive detection of neutrons and photons from Plutonium was performed at the JRC facility in Ispra, Italy. The use of organic scintillators (EJ309) allowed for particle discrimination. Various PuO and PuGa samples with up to 6.2 grams of ^{239}Pu were investigated.

The reconstruction of fission events was performed using coincidence detection of prompt neutrons and γ -photons. The short coincidence time of around 10 ns resulted in a very low background and a clean signal. Preliminary results of the analysis and a comparison with MCNP simulations will be presented.

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