

Finding Resolution and Efficiency for multiple gamma energies for LYSO(Ce), CaF₂(Eu), and NE102A crystals using SiPM.

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The scintillation detectors are one of the best for gamma spectroscopy. Thus, this experiment aims to determine the resolution and Efficiency of the detection system composed of a SiPM board in addition to three types of scintillation crystals. Two of the crystals are inorganic, CaF₂ and LYSO. The third one is organic plastic scintillator crystal, NE102A. 4 different sources are studied in this experiment: Am-241 and Ba-133 for their low energies, Cs-137 for its mid-range Co-60 for its high energy. Each crystal was tested with each source to determine the resolution and Efficiency. For the CaF₂, the resolution for the Am-241 and Cs-137 is 113.14% and 36.78%, respectively. As for the LYSO the resolution for the Am-241, Ba-133 (30.8 and 81 keV), and Cs-137 (32 and 662 keV) is 35.58%, 73.74%, 21.97%, 91.52%, and 11.10%, respectively. Moreover, the NE102A plastic scintillator crystal's resolution for the Am-241 is 37.5%. In addition, the Efficiency was calculated for each source using different crystals; for the CaF₂, the absolute Efficiency for the Am-241 and Cs-137 is 2.76E-03% and 2.15E-04%, respectively. As for the LYSO, the absolute Efficiency for the Am-241 and Cs-137 (662 keV) is 0.104% and 0.013%, respectively. Moreover, in the NE102A plastic scintillator crystal, the absolute Efficiency for the Am-241 is 1.62E-03%

Speaker Bio

Primary authors: HUSSEIN, Tareq (Department of nuclear engineering king Abdulaziz university); Mr ALEM, Nabel (Department of nuclear engineering king Abdulaziz university)

Presenter: HUSSEIN, Tareq (Department of nuclear engineering king Abdulaziz university)

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