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Characterization and Performance of n-type HPGe and Clover detectors at TARLA

High Purity Germanium (HPGe) detectors are very important tools in nuclear and particle physics, primarily due to their low energy thresholds and exceptional energy resolution, which enables precise measurements across a broad energy spectrum. This study aims to comprehensively characterize the performance of four gamma-ray detectors: two n-type HPGe detectors and two Clover detectors, which are located at the Turkish Accelerator and Radiation Laboratory (TARLA). These detectors are needed for high-resolution gamma-ray spectroscopy experiments to be conducted at TARLA both in offline(activation) and in online(NRF) mode. To achieve this characterization, a series of measurements will be conducted, employing a variety of sources and source-detector configurations. This approach will allow for a detailed evaluation of the detectors' responses under different experimental conditions. A selection of sources, including ^{22}Na, ^{137}Cs, ^{60}Co, and ^{152}Eu, will be utilized. The choice of these sources provides a wide energy range, spanning from approximately 40 keV to 1408 keV, as well as a range of activities that are needed for a complete understanding of the detectors' capabilities. The key performance metrics, such as energy resolution, detection efficiency (both absolute and intrinsic), and peak-to-Compton ratio, will be determined. The results of this investigation will provide valuable insights into the operating conditions for these detectors, their accuracy and reliability for use in future experimental measurements at TARLA.

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