

LONG-TERM PERFORMANCE ASSESSMENT OF HPGE DETECTORS USED IN THE NEUTRON ACTIVATION ANALYSIS (LAN) OF IPEN-CNEN/SP (BRAZIL)

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In nuclear spectroscopy measurements, the performance of the radiation detectors employed is a key issue in the final results; moreover, in comparative neutron activation analysis measurements, much of the method's simplicity depends on the stability of the detector between the measurements of the unknown and the comparator, so that the detector's efficiency can be effectively ruled out of the equation.

Due to the relevance of the detectors' performances, LAN-IPEN have been performing daily verification measurements in its operational detectors since 1999; this verification consists in the measurement of composite (⁵⁷⁻⁶⁰Co) sources, in which the position, resolution and CPS (counts per second) for the 122 keV peak of ⁵⁷Co and the 1332 keV peak of ⁶⁰Co are registered, along with the date and time of the measurement. In this work, verification data for 11 HPGe detectors from two different makers and three different intrinsic configurations were analyzed in respect to the efficiency stability (determined by the "arbitrary efficiency" calculated by correcting the CPS for the isotope's decay) and resolution for both peaks, as well as the ratio between the efficiencies for 122 keV and 1332 keV. The results allow a discussion about the stability of these parameters over time (in some cases, almost 15 years), their sensitivity to imminent detector failures and their performance after a failure has been corrected; moreover, the results show a clear correlation between the maker or configuration and the long-term performance of the detector.