

ON THE USE OF GAMMA-GAMMA COINCIDENCE TO DETECT VERY LOW ACTIVITIES

Guilherme Soares Zahn, Frederico Antonio Genezini, Iberê Souza Ribeiro Junior, Esnel Antonio Fagionato
IPEN-CNEN/SP

The detection of very low gamma ray activities is a delicate task, and very important in environmental radiation studies, for instance. It usually requires the use of low-background shielding, as the long counting times required usually make the background subtraction quite tricky, and often result in rather high experimental uncertainties. In this work a different approach is tested, where a two-detector gamma-gamma coincidence system is used to eliminate essentially all of the background continuum - at the cost of reduced overall efficiency and, more importantly, requiring that the radionuclide to be studied presents useful gamma-gamma coincidences. Two distinct methods of analysis are tested, either using an “open-window” coincidence where an event is registered whenever any event is registered in the other detector, or using a strict coincidence analysis, where a valid coincidence between two gamma-rays from the same decay are required; this allow for a discussion on the advantages and problems of each method, as well as for an experimental assessment of the performance of such a system.