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BOOK OF ABSTRACTS

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Application of the new matrix method to coincidence summing effects in gamma spectroscopy

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A new method has been developed for deriving counting rate equations describing coincidence summing of gamma and X-rays for germanium spectrometers. The coincidence summing effects occur whenever two or more cascading photons are emitted from the same nucleus and detected within the resolving time of spectrometer. The application of analytical approaches to coincidence summing effects makes it possible to predict all summation peaks that occur in the spectrum. Our work includes solving the problems of coincidence summarizing by introducing the new method with simpler algebra. The new analytical approach that we have developed also allows us to determine the activity of radioactive sources directly without calibration of the detector, which is very important in metrology of radionuclides. Accordingly, based on the value of the peak area in the spectrum and knowledge of probability transitions between excited states of a nucleus, it is possible to determine the efficiency of detection. This method is successfully applied to the decay of radionuclides ^{139}Ce, ^{57}Co, ^{133}Ba and ^{152}Eu. Results, obtained using the proposed method, are achieved in a much clearer and simpler way.

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