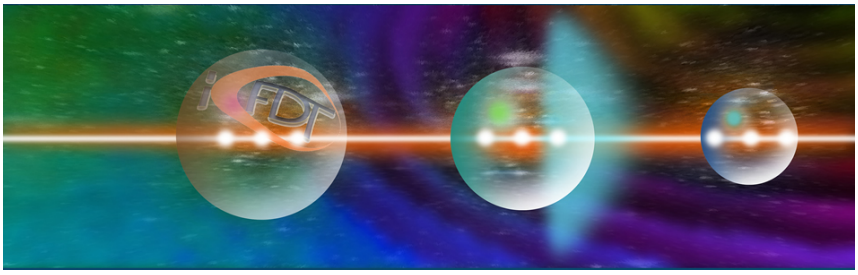

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SNIP-based algorithm for gamma-ray spectrum analysis

Thursday, 4 October 2018 14:30 (1h 30m)

Scintillators are commonly used in many gamma-ray experiments because they are characterized by a good energy resolution and a rather high detection efficiency for a few MeV gamma-rays. Gamma-ray peaks, especially full energy, single escape and double escape peaks registered in scintillators, are relatively broad and observed on a high non-linear background. Any software dealing with the analysis of gamma-ray spectrum has to find peaks and estimate the following peak shape parameters: position, height, width, and a number of counts.
The presented software was prepared for analysis of gamma-ray spectra registered in scintillators. Peak finding is based on the Sensitive Nonlinear Iterative Peak (SNIP) algorithm and peak analysis - on CERN ROOT libraries. An estimation process is automated with a limited number of input values.
A sum of Gaussian and linear function is used to approximate peaks. Because such a function is nonlinear, an iterative method to find peak shape parameters has to be applied. As a result of a computation process, a mean value and a variance of the Gaussian function that corresponds to a location and a peak width are determined. In addition, measures of goodness of fit are computed, i.e. the number of degrees of freedom and results of $\chi 2$ tests. Results of estimation are presented graphically and saved to a text file. The software was written in C++ language.
Gamma-ray spectra measured with scintillators were used to demonstrate properties of the prepared software.

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Primary author: Dr LINCZUK, Maciej (Warsaw University of Technology, Institute of Electronics Systems)

Co-author: Prof. ZYCHOR, Izabella (National Centre for Nuclear Research, Poland)

Presenter: Dr LINCZUK, Maciej (Warsaw University of Technology, Institute of Electronics Systems)

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