



SpectraLine. Alpha-, beta-, gamma- spectrometry

SpectraLine Package

WHEN TO USE IT

SpectraLine software package has been developed for spectrometry measurements and processing of linear spectra, typical for gamma- and alpha- spectrometry, and continuous beta-spectra. Spectra processing procedures include calibration, peaks parameters determination, radionuclides identification and activity calculation.

FUNCTIONS

Precision processing of spectra

Spectra processing algorithms, used in SpectraLine package, consider the specifics of the spectrometers. The sequence of the processing operations, including reading of different spectrum formats, integration with external hardware etc., can be represented as a scenario, so the user can adopt the algorithms to the used hardware almost without limitation.

Database

The selected spectra and their processing results can be stored in the database.

Reports with measurement results

Mass concentration, dose, minimal detecting activity etc. can be displayed in the customized window with calculation results. The user can create his own reports patterns.

Integration with external hardware and software

Software in SpectraLine package support detectors of different types (for gamma-spectrometry - HPGe, NaI, CsI, LaBr3(CI3)) and different manufacturers:

- SPC «Aspect»;
- Bruker Baltic (BSI);
- Ortec;
- GBS Elektronik, Canberra;
- XIA;
- GreenStar;
- IFTP;
- ATOMTEX;
- STC «Amplituda»;
- STC «Expertcenter»;
- SPC «Dosa».

The joint acquisition and processing of spectra for multichannel analyzers are supported. Spectra operations (comparison, addition etc. using spectra measurement time and energy calibration) allow users to compare spectra, measured by different detectors. External programs can be used in SpectraLineXX as an additional instrument for user methodics realization for the specific spectrometric tasks.

Supported formats of spectra

Most of the known formats of spectra are supported::

- *.spc (SPC «Aspect»);
- *.chn (Ortec);
- *.spc;
- *.cnf (Canberra);
- *.mca (BSI, XIA);
- *.wsp;
- *.asc (IAEA);
- *.spc (STC «Amplituda»);
- *.spc (STC «Expertcenter»);
- *.spc (SPC «Dosa»);
- *.sps (Green Star);
- *.ats (ATOMTEX);
- *.spm (extended, «LSRM»).

SpectraLineXX1.5. New functions

Spectra processing

- Algorithms of spectra processing are optimized, so the precision and stability of activity calculation are increased, especially for spectra with complex composition.
- A priori information about activities of radionuclides and their ratios can be used in the spectra processing procedure.
- The procedure of activity calculation by etalon spectra method can be used for spectra of the samples with nuclides, for which there are no etalons. Unlike the traditional way the calculation provides unbiased estimation of activity for the analyzed radionuclides.
- The procedure of identification and activity estimation can be used for volume source in the shielding container with unknown thickness of containers layers and the source.

Scenarios

The list of commands of the scenarios has been significantly extended. Now the complex schemes of measurement and processing of samples, spectrometer calibration, background measurement and other tasks can be realized.

Materials database, absorption consideration

- Database with absorption values of gamma-radiation in different materials on the base of Photon Cross Sections Database (<http://www.nist.gov/pml/data/xcom/index.cfm>) is used in the software. So the absorption can be calculated with high precision and the reliability of the processing results is increased.
- The new utility for the materials database editing is included into the delivery kit. The GUI in this utility is updated to simplify the materials operations.

Joint measurements

The function of the joint measurement and processing for two-channels beta-gamma-spectrometers is added, so their using is simplified and precision of activity calculation is increased, especially for beta-emitting radionuclides.

Modes

Operations can be performed in operator-administrator mode. The functions of measurement and processing of the sample can be only available in operator mode. The processing settings and expert settings can be protected by password.

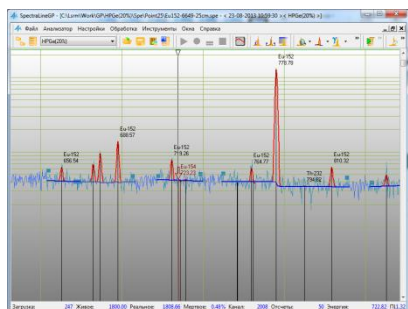
Start with parameters

New parameters of the command line are supported, so the processing scenarios can be run at the software start.

SpectraLineGP

The software has been developed for precision processing of gamma-spectra, measured by semiconductor and scintillation spectrometers. The main features are:

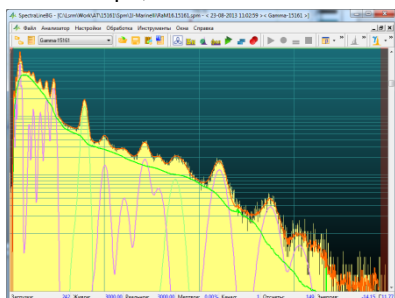
- algorithms of peaks search and multiplets separation;
- calibration by the peak shape;
- different methods of activity calculation;
- cascade summation effects consideration;
- computational methods of registration efficiency calculation.



SpectraLineBG

The software has been developed for spectrometric analysis using both semiconductor and scintillation gamma-beta-spectrometers and it supports all SpectraLineGP functions. The main features are:

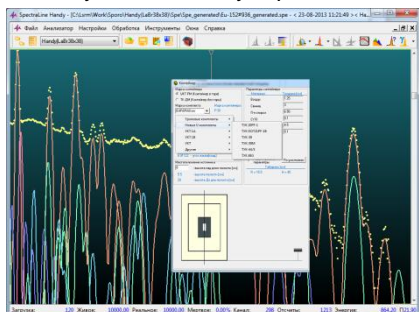
- gamma-beta-spectrometric analysis with the use of etalon spectra method;
- energy calibration by the spectrum shape;
- new method of activity calculation for complex gamma-spectra with arbitrary radionuclide composition — «quasi-etalon» spectra method;
- measuring protocols for typical certification measurements.



SpectraLineHandy

The software has been developed for operations with portable spectrometers and it supports all SpectraLineGP functions. The main features are:

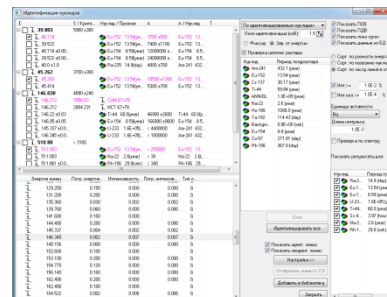
- the database of transport containers and consideration of radiation absorption in the walls of the container;
- activity estimation for the case of unknown thickness of the container;
- efficiency correction by the source-detector distance;
- activity calculation by «quasi-etalon» spectra method.



SpectraLineID (Identification)

The software has been developed for expert operations for identification of spectra with complex radionuclide composition with the use of Nuclide Master. The main features are:

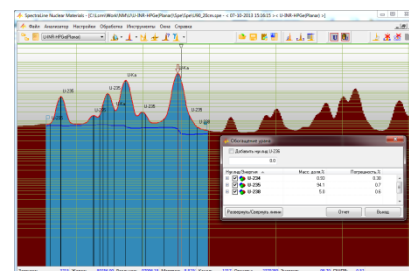
- analysis of unidentified lines by the full database of radionuclides (on the base of ENSDF-data);
- filtration of radionuclides by half-life period, energy spectrum etc.;
- analysis of the decay chains;
- analysis of escape peaks, peaks of random and true summation;
- visual comparison of spectra.



SpectraLineNM (Nuclear Materials)

The software has been designed for determination of isotopic composition of uranium and plutonium for both planar and coaxial HPGe-detectors. The main features are:

- modeling of the form of x-radiation line;
- registration efficiency correction by the measured sample;
- specialized reports;
- determination of the degree of uranium enrichment and isotopic composition of plutonium;
- processing of X-ray fluorescence analysis spectra of uranium-plutonium samples;
- determination of the degree of uranium enrichment by the relative method for the samples with the known efficiency calibration.



SpectraLineAda (Alpha Decay Analysis)

The software has been developed for alpha-spectrometric analysis with spectrometers on the base of both semiconductor detectors and ionization chambers. The main features are:

- processing of alpha-spectra of both «thin» and «thick» sources;
- consideration of thin structure of alpha-spectra, parametrical description of the shape of the peak;
- consideration of contribution of conversion electrons;
- activity calculation by the inserted label;
- calculation of the radiochemical yield.

