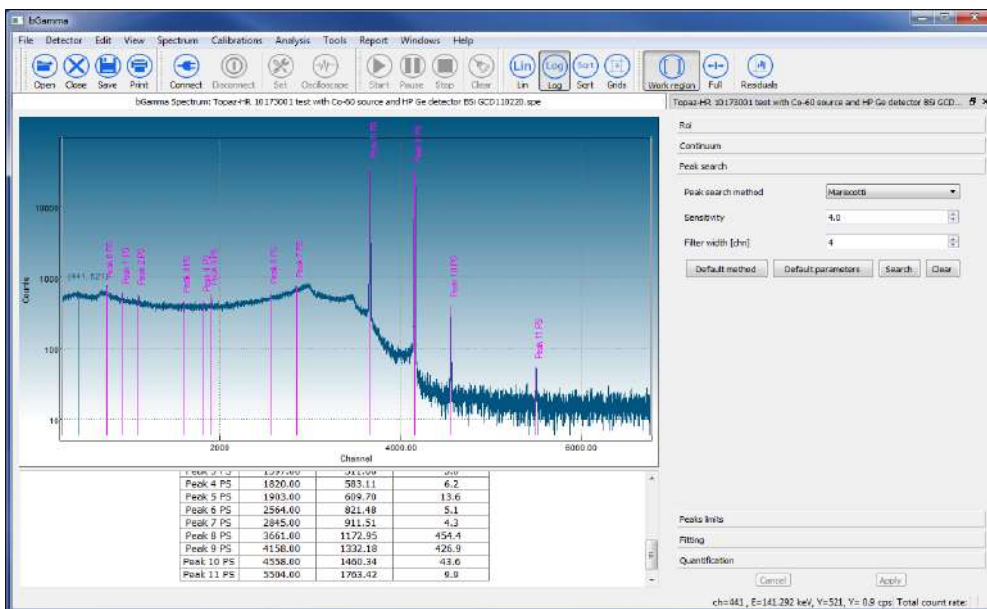


TECHNICAL SPECIFICATIONS

bGamma Software Package



INTRODUCTION

The analysis of the energy spectra resulting from any radioactive sample and recorded with a nuclear radiation detection system is still a very critical step in gamma-ray spectrometry due to its complexity, e.g. large amount of interference between elemental emissions, presence of spectrum artifacts (sum and escape peaks), complex continuum, correct radionuclide identification and quantification of its activity independently of the measurement geometry or sample characteristics among many others.

bGamma software is a general purpose, comprehensive and extensive software package for gamma-ray spectrum analysis and radionuclide identification and quantification.

bGamma software can analyze any recorded gamma-ray spectrum independently of the detector, geometry or sample used. bGamma software package provides all the necessary tools and functionality for performing the detailed analysis of complex gamma-ray spectra and the corresponding radionuclide quantification from the given sample.

In particular the software allows to:

- Connect and control the hardware for correct data acquisition
- Controls and visualizes the data acquisition
- Imports spectra from other file-formats
- Energy, shape and efficiency calibration for the gamma-ray spectra
- Automatic peak search and peak class identification (singlets, multiplets)
- ROI analysis and calculations
- Fitting of the experimental data to mathematical models, including background subtraction, peak interference correction, etc.
- Nuclide identification with separation from possible spectrum artifacts and structures
- Radionuclide activity calculations

All of above in a very simple and yet powerful way. The modern graphical user interface (GUI) makes spectrum visualization and analysis very intuitive and provides an important "visual" feedback of the analysis results.

bGamma software is a multi-document software allowing you to analyzed multiple-spectra at the same time and/or acquire data from several connected detectors.

The large quantity and variety of calculation algorithms implemented into bGamma allows you to analyze a broad range of gamma-ray spectra independently of the detector used, e.g. from high-resolution Ge spectra to medium resolution scintillator spectra from LaBr₃ or the vastly-used NaI(Tl).

bGamma software runs seamlessly on MS Windows®, Linux™ or macOS®.



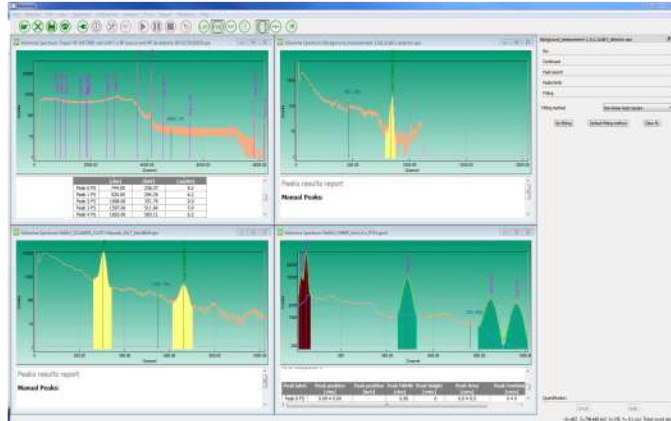
FEATURES

- Controls data acquisition via detector-MCA setups
- Implements different automatic peak search methods
- Provides different methods for peaks' continuum subtraction
- Region of interest (ROI) calculations and automatic and/or manual marking
- Energy and shape calibrations using comprehensive data input with visual interaction
- Easy to perform and yet powerful efficiency calibration
- Implements several spectrum analysis fitting methods, including **Bayesian fitting**. This wide choice of analysis methods warranties the success and/or suitability of spectrum analysis for any kind of gamma-ray spectrum and analysis needs
- Fitting and mathematical model parameters are at hand for their quick changes and optimization
- Visual distinction and marking of ROIs and peaks in the spectrum. Multiple peak labelling implementation
- Advanced graphical user interface (GUI) that can be set to user's preferences
- Advanced spectrum cursor showing satellite or spectrum artifacts
- Multi-document design with full data synchronization
- Great traceability, saving all information into XML-formatted files (*.gxml)
- Import spectrum from other formats. E.g. Ortec (chn) and Canberra (*.cnf) files
- Customizable analysis reports, including fully colored and HTML-formatted tables
- Quantification via different methods
- Provision of full radionuclide library based on internationally well-know and maintained "NuDat" nuclear data files
- The software is multi-platform and runs seamlessly under MS Windows®, macOS® or Linux™

SPECTRUM ANALYSIS

bGamma incorporates a powerful collection of calculation engines necessary for accurate gamma-ray spectrum analysis of any kind. They can be summarized as follows:

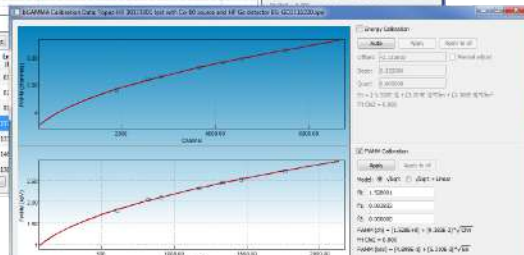
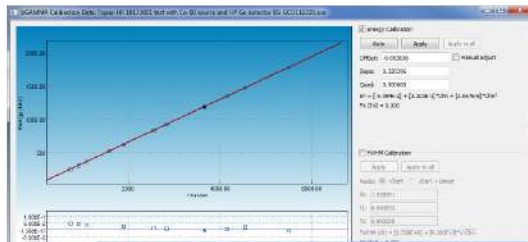
- ROI computations
- Continuum calculation methods
- Peak search engines
- Peak qualification methods and automatic ROI location
- Peak fitting algorithms
- Energy calibration methods
- FWHM calibration methods
- Efficiency calibration methods
- Nuclide identification techniques
- Activity calculation algorithms



CALIBRATIONS

Calibrations are an essential process to correctly analyze any gamma-ray spectrum. bGamma offers all the necessary tools and functionalities to make any calibration in gamma-ray. The energy and shape (fwhm) calibrations are unified into one dialog. They contain a lot of hidden “know-how” for suggesting lines to be used for calibrations in dependence of the type of the spectrum and detector. A powerful GUI provides visual feedback to the calibration results.

Efficiency calibration uses a versatile fitting engine to derive the complex calibration coefficients in a polynomial of a logarithmic of energy. This calibration dialog also provides a simple but yet comprehensive GUI for immediate and visual feedback of obtained efficiency calibration results.



NUCLIDE LIBRARY

bGamma incorporate the entire radionuclides decay emissions database. All nuclides data are available at any instance of the spectrum analysis and/or data visualization. The nuclide decay data are taken from the internationally well-known data file – NuDat, which is produced, certified and maintained by the International Nuclear Data Committee.

REQUIREMENTS

bGamma is a multiplatform software and runs on the following OS:

- Microsoft Windows XP™ up to Windows 10™
⇒ 32-bit or 64-bit processors
- macOS®
- Linux™

ORDERING INFORMATION

1. bGamma application software. Single license and single input
 - Right to run the software from a single PC. Connection to only one detector (hardware)
2. bGamma application software. Single license and multiple inputs
 - Right to run the software from a single PC. Connection to multiple detectors (hardware)
3. bGamma application software. Network license.
 - Right to run the software from a PC connected to a network. The number of instances of the software will dependent of the number of “licenses” purchased or activated.
4. **bGamma package:** Includes full bGamma application software (single license) + Topaz-HR MCA

ADDITIONAL INFORMATION

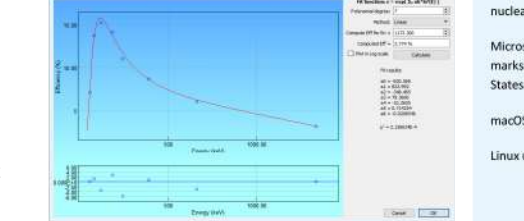
The bGamma product line includes the “bGamma Programming libraries”, which are offered as separate product. Please contact us for more details on using “bGamma programming libraries” and its license options.



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Radionuclide	Decay Mode	Energy (keV)	Branching Ratio (%)	FWHM (keV)	FWHM (keV)	FWHM (keV)	FWHM (keV)
1	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
2	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
3	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
4	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
5	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
6	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
7	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
8	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
9	137Cs	648.47	84.6	0.02783	0.02783	0.02783	0.02783
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NuDat was developed by the National Nuclear Data Center (NNDC) in Brookhaven National Laboratory, USA. It provides data extracted from several databases containing nuclear structure, nuclear decay and some neutron-induced nuclear reaction information.

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