Key features of bGamma

BrightSpec NV

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SUMMARY

- Unique features → feature not existing in any commercial software

- Outstanding → remarkable implementation of this feature

- Highlight → Feature that, as a result of its implementation, could position this product at the top of the selection list even when other similar products would have this feature realized as well.
Platform independent

- Run seamlessly in any Operating system
  - MS Windows:
    - XP, 7, 8 and 10.
  - Linux
  - mac OS
- Wide hardware support
  - X86 (32-bit) μProcessor
  - 64-bit μProcessor
  - ARM μProcessor
Platform independent

mac OS

Raspberry Pi
Generic software

- Multipurpose and generic software for gamma-ray
  - Analysis of **ANY** type of Gamma-ray spectra independently of the detector used for its measurements
    - Low–medium–high energy resolution detectors
      - BGO, CsI, NaI(Tl), CeBr₃, SrI₂, LaBr₃
      - HPGe, Si(Li) and CdZnTl
    - All analysis parameters are at hand and saved as “model”.
      - Models can be imported for quick spectrum analysis

![Software interface](image)
MultiDocument

- Allows working with many spectra at the same time
  - Can mix spectra being acquired (hardware control) with spectra from saved files
  - Use of docking and floating windows
Outstanding GUI

- Modern, comprehensive, powerful graphical user interface (GUI).
  - Nearly any analysis or calculation step is provided with visual feedback.
Outstanding GUI

• Peaks and ROI results data at hand.
• Each spectrum plot with residuals and its individual report panel
Accurate calculations

- All... absolutely all and any calculated magnitude is reported with corresponding uncertainty value
- **Co-variances** are taking into account for uncertainty calculations
Manual or Visual operation

- Ability to insert/remove peaks and ROIs by several methods
  - Visually via GUI
  - By nuclide library
  - Automatic by mathematical algorithms
Manual or Visual operation

• Use of Multi-cursors
  ▪ The use of “Spectroscopy-aware” cursors make easier the spectrum analysis and visual NID
Computational algorithms

• Large selection of computational algorithms, included in the standard version of the software
  ▪ Continuum models
    • By entire spectrum or per individual peaks
  ▪ Extensive ROI calculations
  ▪ Peak search and marking
    • 7 peak search methods
    • 4 peak marking and ROI identification algorithms
  ▪ Three (3) peak fitting algorithms
    • Includes Bayesian peak fitting
• This wide range of choices warranties the success of the spectrum analysis from any type of detector, energy range and/or energy resolution
Computational algorithms

- Outstanding peak fitting and multiplet deconvolution
  - With visual feedback (residuals plot)
  - And Statistical qualifiers in the report (e.g. colored $\chi^2$)
Computational algorithms

- Implements **Bayesian peak fitting**
  - Minimum input parameters
  - Does NOT rely on shape (FWHM) calibration
Import files

- Can open files from:
  - IAEA (*.spe)
  - Canberra, binary (*.chn)
    - NO need of Canberra VDM or run time libraries installation
  - Ortec (*.chn)
  - ANSI N42.42
    - Including latest edition N42.42.2012
  - Generic text file
Reports

- bGamma produces colored, rich–formatted and aligned reports
- HTML–based reports
Reports

- Reports contain colored and well formatted tables
  - Colors are used to flag statistically doubtful calculation results
- Dedicated reports for specific sections
- Reports can include plots images (e.g. spectrum plot with fitting results)
- Report templates can be created, using HTML commands, for more specific or user-defined spectrum analysis reports
  - HTML markup is widely supported and easy translatable to other applications (e.g. MS Explorer)
  - No need to learn dedicated or specific scripting languages and/or commands
- Reports can be exported into PDF
Nuclide library

- Broader meaning of nuclide library
- bGamma includes the whole decay radiation data from 3386 nuclides
  - NuDat decay data files
  - Recommended and maintained by INDC and BNL (USA)

- Any radiation is always at hand
  - No need for getting out of the analysis to “search” for the correct nuclear radiation or edit the nuclear library file.
  - Spectrum analysis steps are fully reproducible, since it does not contain links to external nuclear data files
  - Provision of “fast radiation search”, tagged isotopes or isotope radiations, etc.
Hardware control

- Within bGamma you can connect, set and control any BrightSpec hardware for data acquisition
- Provision of an auto-updated applet, according to connected hardware capabilities
  - Extensive counting preset modes
- Provision of a dockable digital oscilloscope for hardware troubleshooting
SUMMARY OF FEATURES

Brief summary of most important application features
Unique features

• OS-independent
  ▪ The only software in the market that runs on MS Windows (XP, 7, 8 and 10), Linux and mac OS
  ▪ With wide support of μProcessors:
    • X86, 64–bit and ARM

• Inclusion of Bayesian peak fitting algorithms
  ▪ Allows the possibility to fit spectra with minimum input data (e.g. calibrations)
  ▪ Mark/insert a peak and fit straight-away
Unique features

• Entire nuclear decay radiation data embedded into the application.
  ▪ Fast access to any decay radiation
  ▪ ALL decay radiations are quickly at hand
    • No need for external nuclear library files
    • Spectrum analysis goes smoother. No need for endless cycles of exiting application or spectrum analysis process to edit/search nuclide library for specific radiations.
    • No links to external files (e.g. nuclide library file) which can be missing and therefore impossible to recreate the spectrum analysis

• Every calculated magnitude is reported with its uncertainties

• Covariance inclusion on the uncertainties treatment

• Outstanding Graphical User Interface
  ▪ Many features (see previous slides)
  ▪ Possibility to view all calculated parameters and magnitudes in tables and most of them updated on “real time” even while data acquisition is performed
**Outstanding feature**

- Can analyze any gamma-ray spectrum. Independently of the detector used, energy resolution or energy range
- Easy but comprehensive methods for energy and shape calibrations, with provision of visual feedback
- Calculation of MDAs following ISO11929 standard (up-to latest revision), with clear results and recommendations
Highlighted features

- HTML-formatted reports
  - Including tables with colored cells for data results warnings
- Import of foreigner file formats, like Canberra CNF does not need any extra files or libraries to be installed
  - Imports N42.42 (up to latest edition)
- Simple and “automatically updated” window for hardware control
- Spectrum analysis parameters can be exported\imported as Model.
- Fats and intuitive operations within an outstanding GUI.
  - Peaks insert\delete, multi–cursor, nuclide search, etc.
  - Residuals plots, model parameters at hand, etc.