

Managing Binary Files for Spectroscopy (MBFS)

Edited by :

L. El Amri

lahssenelamri@gmail.com

Nuclear Reactor Energy and Physics, Nuclear Security and Environment Team (PRESN),
Faculty of Sciences, Mohammed V University, 4 Avenue Ibn Battouta, B.P. 1014, Rabat,
Morocco

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I - Introduction

This manual has been developed to provide clear and accessible guidance on the use of the Managing Binary Files for Spectroscopy (MBFS) software. Designed for users of all levels, this guide details the essential features of MBFS, with an emphasis on the manipulation of .CHN, .SPE, and .SPC file formats. Each section of the manual provides a thorough explanation of the available options, in order to ensure a complete understanding of the graphical interface. The goal is to enable the user to navigate efficiently through the software, taking advantage of its capabilities to read, modify, create, and convert spectroscopic files. Thus, this manual is positioned as an indispensable tool to maximize the use of MBFS.

II - Complete graphical interface of the software.

When installing MBFS, a user-friendly graphical interface automatically appears (as shown in Figure 1). This interface offers a complete set of essential tools and features to manipulate and display the data contained in the files we want to read. Among these features, we find the possibility of viewing the file name, the energy calibration, as well as a detailed description of the analyzed sample, among other relevant information.

In addition, this interface has an options bar located at the top of the window, allowing access to additional features to manage and process the files optimally. These options include, for example, the possibility of importing or exporting data. Thus, MBFS presents itself as a complete and intuitive tool for all your needs in spectral data processing and visualization.

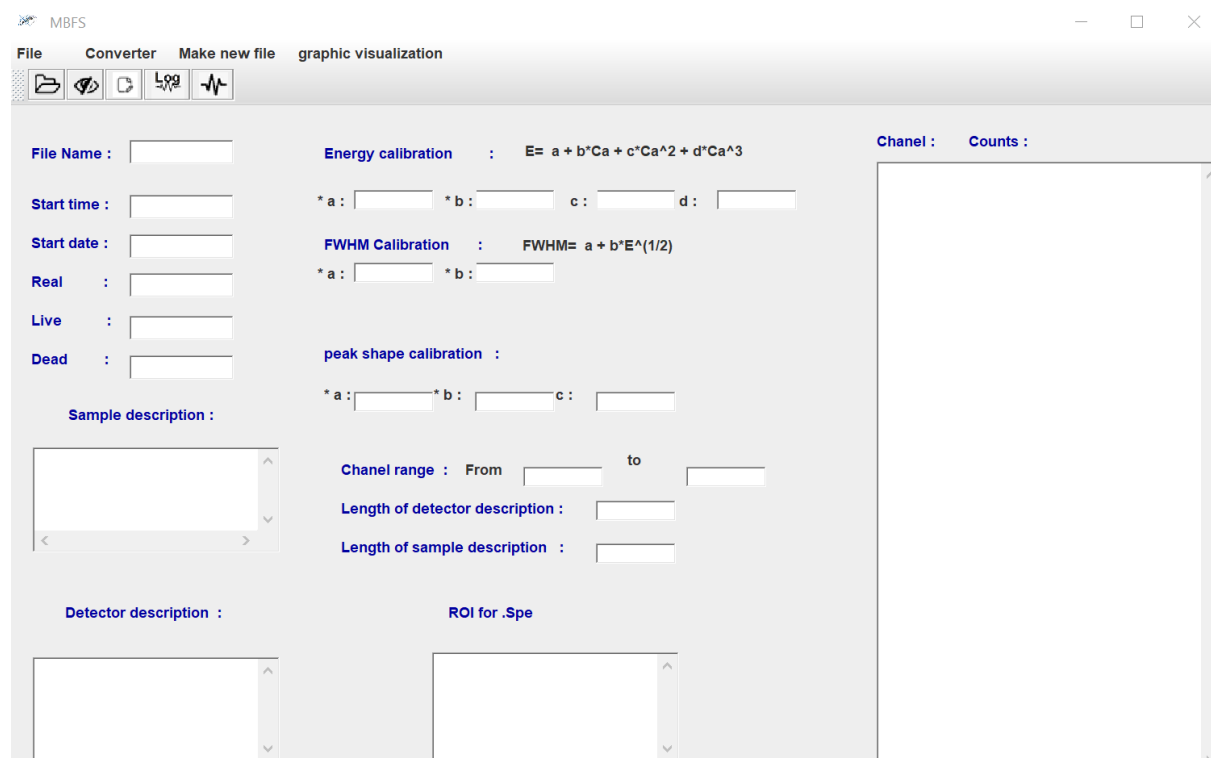


Figure 1 MBFS GUI

III - Software Presentation

In order to facilitate the understanding of this guide and to make the use of the software more intuitive, the graphical interface has been carefully divided into four distinct parts, as illustrated in Figure 2. Each section of the interface has a well-defined role, allowing the user to easily navigate between the different functionalities of the software.



Figure 2 four distinct parts of the graphical interface

1. Menu bar:



Figure 3 menu bar

The menu bar, located at the top of the interface, is the central point for accessing the software's various commands. It groups together drop-down menus "File", "Conversion", "Create a new file" and "Graph visualization". Each menu contains sub-options for performing various actions. This structured organization guarantees quick and logical access to the main functionalities, making the software both powerful and user-friendly.

1.1. File

This option allows you to read and import files of different formats used for spectral data, including .CHN, .SPE, and .SPC. By selecting a file, the software opens it and extracts the information contained, such as spectra and associated metadata. This feature guarantees broad compatibility with various file formats commonly used in spectral analyses. The user can thus work directly with raw files without the need for prior conversions.

1.2. Conversion and modification:

The conversion option allows to transform files from one format to another, for example from .CHN to .SPE or .SPC, and vice versa. And also allows to modify the file content. This feature is particularly useful to ensure interoperability between different software or to standardize file formats before analysis. In a few clicks, the user can select the source file, choose the destination format, and execute the conversion. The software ensures that all data, including metadata and calibrations, are correctly transferred during conversion. This allows increased flexibility in file management. If the user wishes to modify the content before conversion, can do so by changing the case and tables in part three of the GUI.

1.3. Create New File:

This option allows the user to create a new empty or pre-filled file, in the format of their choice among .CHN, .SPE, or .SPC. The user can specify initial parameters, such as energy calibrations and sample metadata, before saving the file. This feature is particularly useful for preparing template files or organizing data before analysis. The process is simple and guided, ensuring error-free file creation.

1.4. Graph Visualization:

The graph visualization option allows viewing spectral data in graphical form, providing a visual representation of the spectra. The user can thus directly observe the distribution of intensities as a function of energy or frequency, facilitating the interpretation of the results. This feature includes interactive tools for zooming, moving, and annotating graphs, thus improving visual analysis using only the computer mouse. The generated graphs can be exported for inclusion in reports or presentations. This option is essential to visually understand the characteristics of the spectrum.

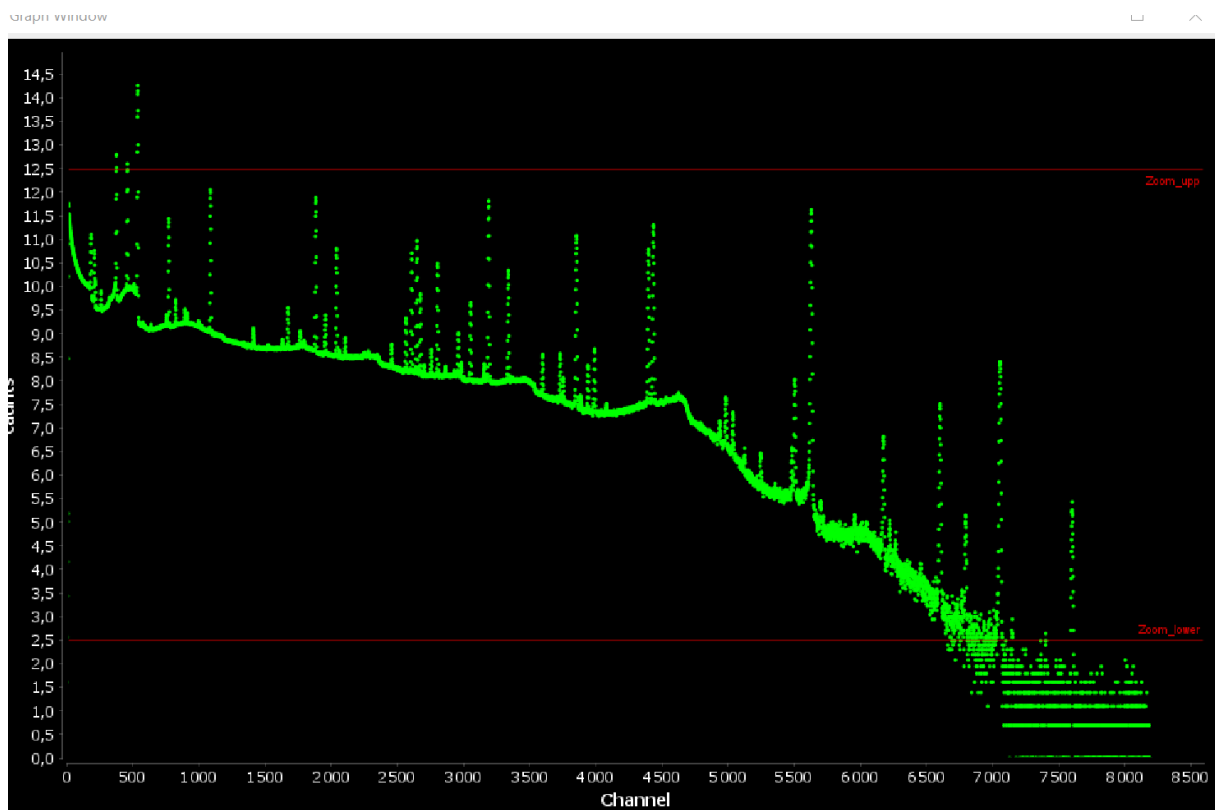


Figure 4 Gamma spectrum graph

2. Icon bar:



Figure 5 Icon bar

Directly below the menu bar, the icon bar offers shortcuts to the most commonly used functions, thus saving the user considerable time. This bar groups together a series of clickable icons representing actions such as opening a new file. Each icon is associated with a specific function, thus allowing a fluid and intuitive interaction with the software.

2.1. The first icon:

This first icon allows the user to open a file directly from the graphical interface. By clicking on this icon, a dialog window opens, allowing to navigate through the directories and select a file in the compatible format (.CHN, .SPE, .SPC). Once the file is selected, it is automatically loaded into the software, and the corresponding data is displayed in the appropriate sections of the interface. This icon facilitates quick access to files for immediate analysis.

2.2. The second icon:

This second icon allows you to reset the GUI by clearing all the content currently displayed. With a single click, the user can clear the data, graphs, and information on the screen, returning to a blank

state. This feature is particularly useful when the user wants to load a new file or start over without interference from previous data.

2.3 The third icon:

This third icon allows you to reread the data from the already loaded file and regenerate or recreate the information in the GUI. If changes have been made to the file or if errors have occurred during the first loading, this icon offers a quick solution to refresh and recreate the data. The user can thus ensure that the interface faithfully reflects the information contained in the file without having to manually reopen it.

2.4. The fourth icon:

This fourth icon activates the display of the spectrum graph in logarithmic scale, offering a different perspective on the distribution of the data. This type of display is particularly useful for viewing spectra where the values cover a wide range, as it highlights details in low intensity regions. By clicking on the icon, the graph is automatically recalculated and redrawn in log, allowing a finer visualization of variations over several orders of magnitude.

2.5. The fifth icon:

This fifth icon allows you to switch the display of the spectrum graph to a linear scale, i.e. with normal axes. This display mode is more intuitive for directly interpreting the absolute values of the intensities as a function of energy or channel. By clicking on this icon, the graph is recalculated to display the data in their most classical form, thus facilitating the reading and presentation of the results when the values do not vary exponentially.

3. Data display area:

The data display area occupies a large part of the interface and is dedicated to visualizing essential information extracted from open files. This area can display various types of data, such as summary tables, metadata information. It is designed to provide a clear and structured view of the information, thus facilitating the interpretation of the data and making decisions based on the displayed results.

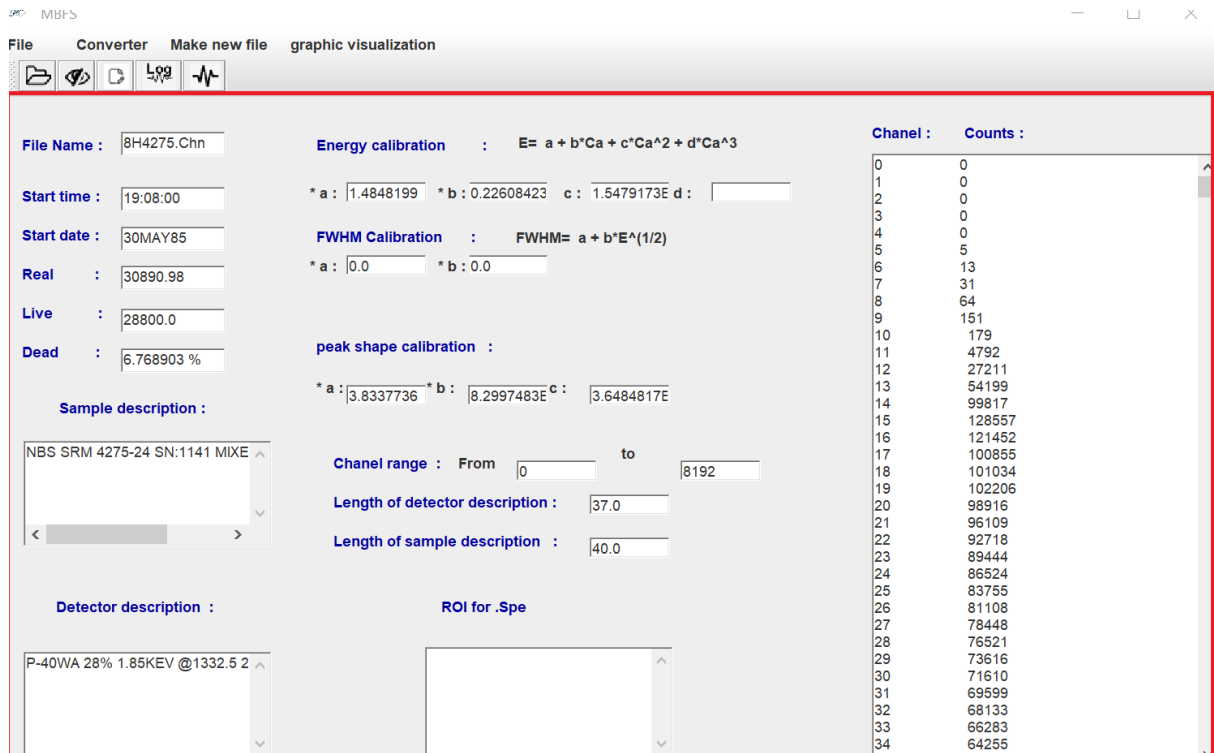


Figure 6 Data display space

4. Graph Window:

The graph window is the central element of the interface where data is represented graphically. This window allows the user to visualize the spectra. It also offers interactive tools to zoom in, out, move or annotate the graphs, thus allowing a thorough and precise analysis of the data. The graph window is essential to interpret the results visually, making data analysis more accessible and understandable.

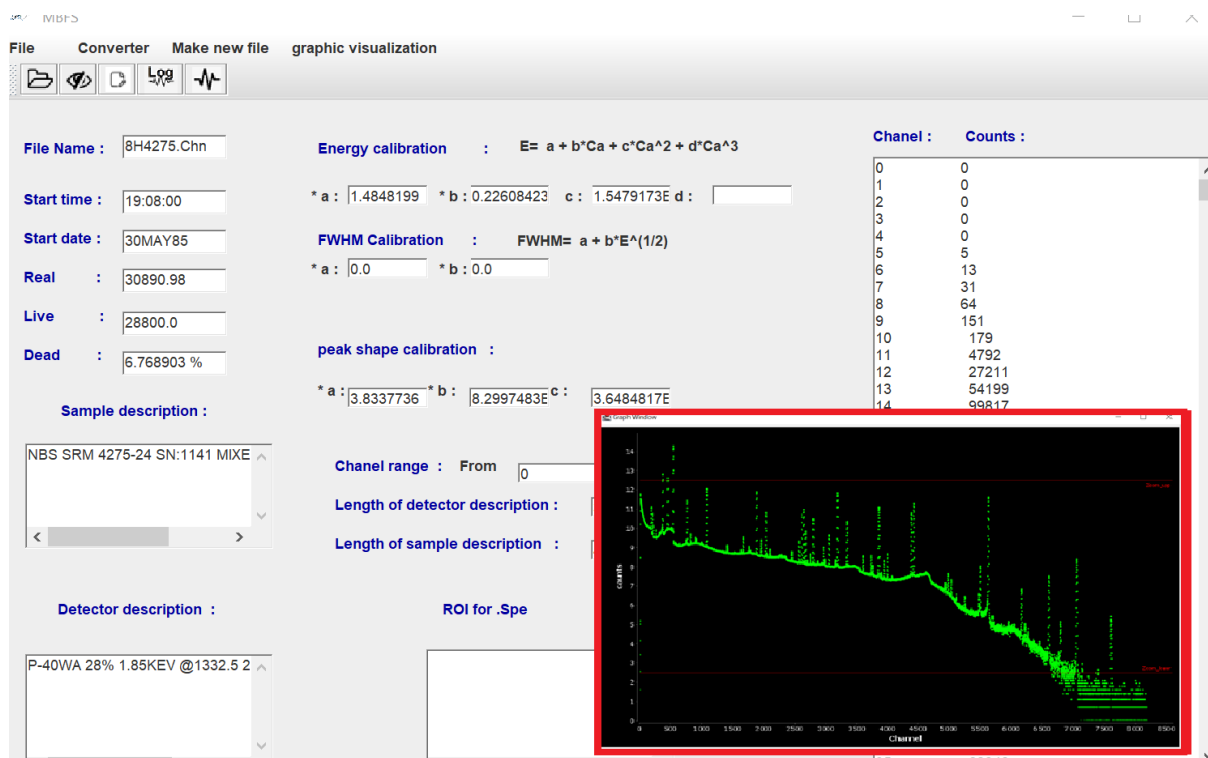


Figure 7 Graph window