



PTB Tools Documentation

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PTB-Division 8.14

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1 Description

PTB Tools is software designed to run various B_1^+ Mapping and Shimming algorithms in the context of Magnetic Resonance Imaging (MRI) at ultra-high magnetic fields, used by [division 8.14](#) of the Physikalisch-Technische Bundesanstalt (PTB).

The software's frontend is designed using HTML, CSS, and Vanilla JavaScript. The backend is programmed in Python, using the [Flask](#) library. The graphical interface of the software is expected to be run in the Google Chrome browser.

2 Installation Instructions

Follow the next steps to install everything needed to run this software.

1. Clone the Github repo:

```
1 git clone https://github.com/Spoksonat/PTB-Tools.git
```

2. Navigate to the project directory:

```
1 cd PTB-Tools-main
```

3. Install dependencies:

```
1 pip3 install -r requirements.txt
```

3 Execution

To access the graphical interface, you must follow the next steps:

1. Change the access permissions to the main bash script:

```
1 chmod u+x execute_app.sh
```

2. Execute the main bash file

```
1 ./execute_app.sh
```

Note: If the software stops running and you want to access the graphical interface again, just execute the second step.

4 General Structure and Use

After executing the command:

```
1 ./execute_app.sh
```

the main window of PTB Tools opens, as shown in Figure 1.

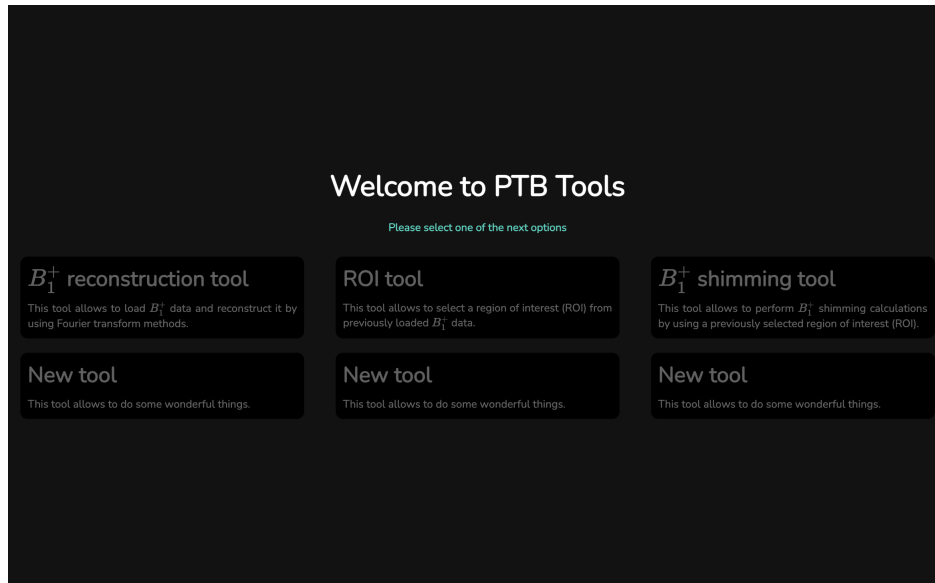


Figure 1: Main Menu of PTB-Tools.

The main menu features six tools, and you can access each of them by clicking the corresponding button. Let's take a closer look at each of the six tools.

4.1 B_1^+ Mapping Tool

Once you click the " B_1^+ reconstruction tool" button, the menu for the B_1^+ Mapping Tool will appear, as shown in Figure 2.

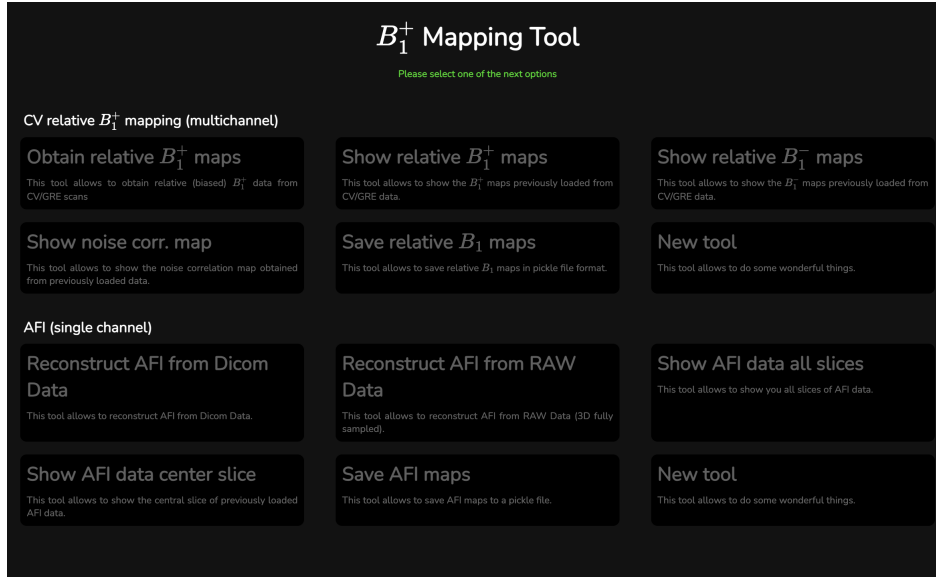


Figure 2: B_1^+ Mapping Tool.

The B_1^+ Mapping Tool consists of two main features:

- **CV relative B_1^+ mapping (multichannel):** This tool allows you to load and reconstruct CV/GRE scans, as well as obtain and visualize the corresponding maps of B_1^+ , B_1^- , and Noise correlation.
- **AFI (single channel):** **Note that this tool has not been implemented yet.**

The instructions for using each of these features will be described in detail below.

4.1.1 CV relative B_1^+ mapping (multichannel)

First, you must load the CV/GRE scan data by clicking the corresponding button. After clicking the button, a window will appear, as shown in Figure 3.

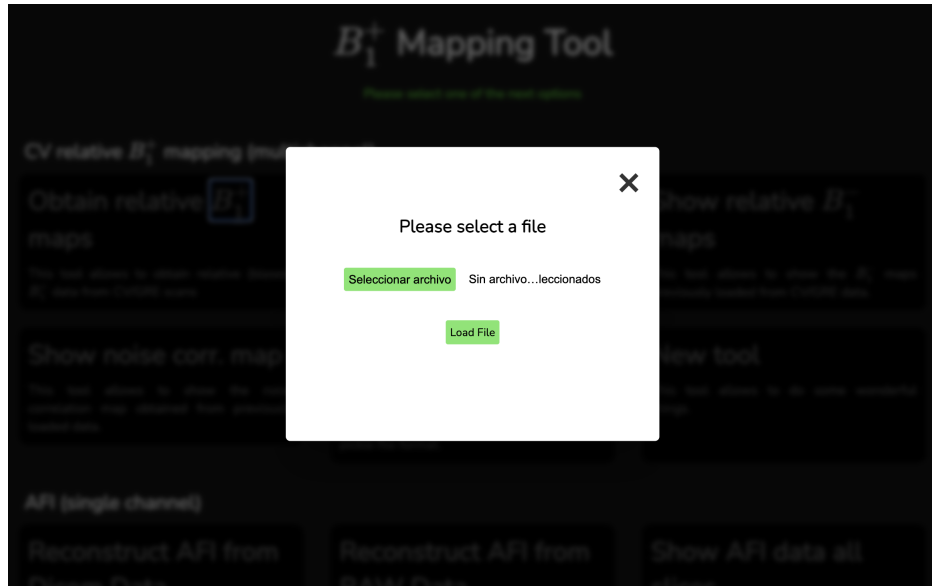


Figure 3: CV/GRE load window.

If you click the "Select File" button, the file explorer will open. You must select the file with the `.dat` extension that you want to open¹. Once you select the desired file, you should press the "Load File" button to load the file.

Once the file has been loaded and the respective B_1^+ , B_1^- , and Noise correlation maps have been obtained, these maps can be viewed by clicking the "Show relative B_1^+ maps", "Show relative B_1^- maps", and "Show noise corr.map" buttons respectively. Figure 4 shows the window where the B_1^+ relative maps are displayed. To return to the previous menu, you can press the "Go back" button. The same instructions apply to the windows where the B_1^- relative and Noise correlation maps are displayed. The maps were generated using the Python library called [Bokeh](#).

¹The file must be located at [PTB-Tools-main/main/files/RAW](https://github.com/PTB-Tools-main/main/files/RAW)

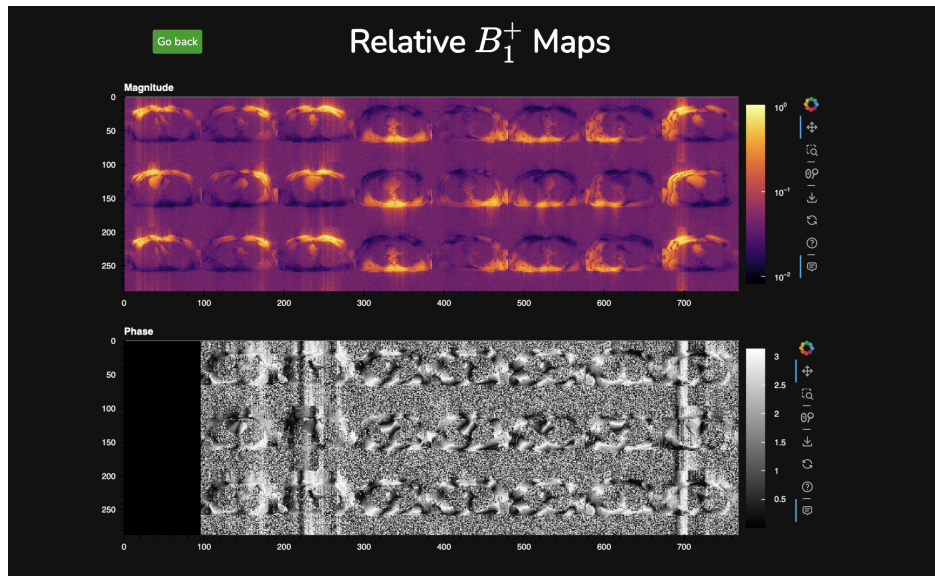


Figure 4: Example - Relative B_1^+ maps.

Note: If the "Show relative B_1^+ maps", "Show relative B_1^- maps", or "Show noise corr.map" buttons are pressed before loading the CV/GRE data, the alert shown in Figure 5 will appear.

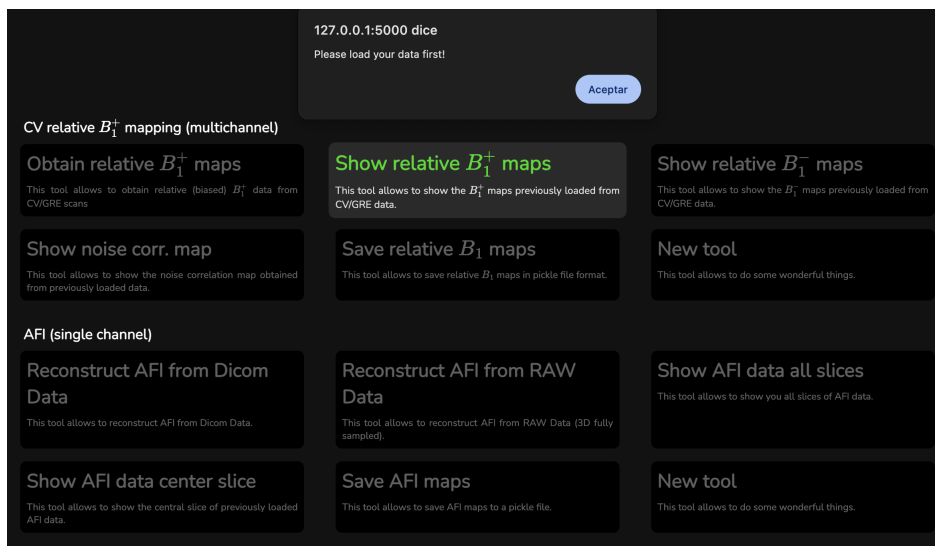


Figure 5: CV/GRE loading alert.

Note: If any "New tool" button, related to additional tools that might be implemented in the future, is pressed, the alert shown in Figure 6 will appear.

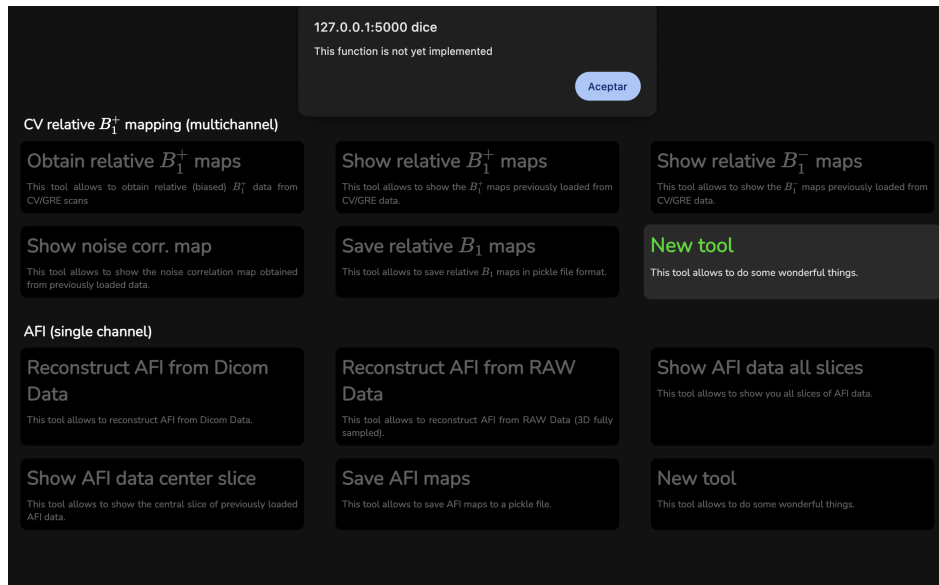


Figure 6: New tool alert.

If you want to save your B_1^+ , B_1^- , and Noise correlation maps, you must press the "Save relative B_1 maps" button. When you press this button, the window shown in Figure 7 will appear. In the gray rectangular space, you can write the name under which you want to save your B_1^+ , B_1^- , and Noise correlation maps. Finally, you should press the "Save File" button. The file will be saved as a [Python-pickle](#) file with a `.pkl` extension in the [PTB-Tools-main/main/files/B1p_maps](#) directory.

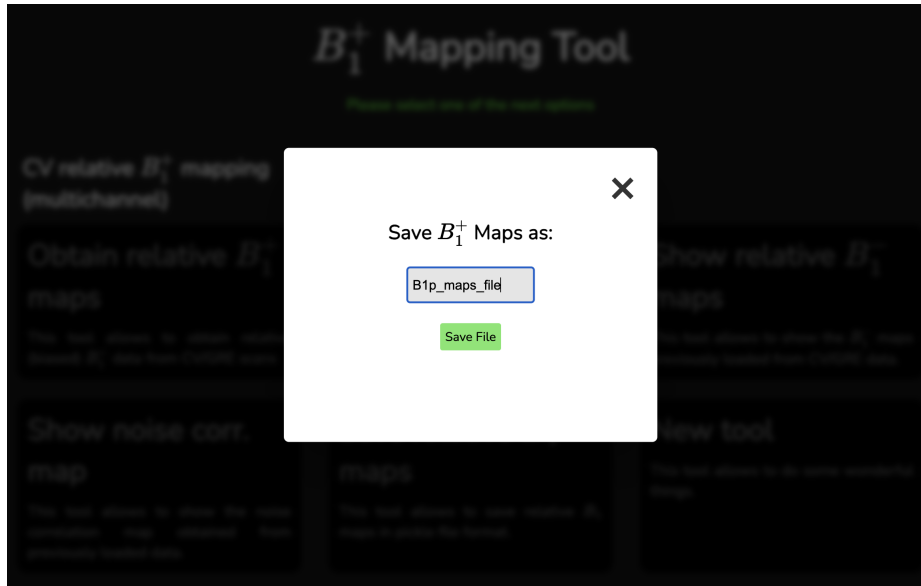


Figure 7: Save B_1 -data tool.

4.2 ROI Tool

To be developed

4.3 B_1^+ Shimming Tool

To be developed

5 Contact Information

For any questions or suggestions, please contact:

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