

Introduction into Plot.py (dnsplot)

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This Program is intended for users of the DNS instrument at the FRM-2 reactor in munich. Every feedback and bug-report is welcome.

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1. How to Start the Program:

Basically there are two ways to open files with the Program, the use Filenames and the -files option, which gives more control over the functionalities. For example to open all files from test0001test.d_dat to test0123test.d_dat this could look like the following:

```
dnsplot test*.d_dat
```

or equivalent:

```
dnsplot -files test 0 1 0 -1 test.d_dat
```

The items for the -files option is are: [prefix] [omega offset] [increment] [from] [to] [postfix]

All optional parameters for the program can be shown with:

```
dnsplot -help
```

Here are just some more common examples:

```
dnsplot test01*.d_dat -inc 2 -split 20 -sample TestName -vana vana.d_dat
```

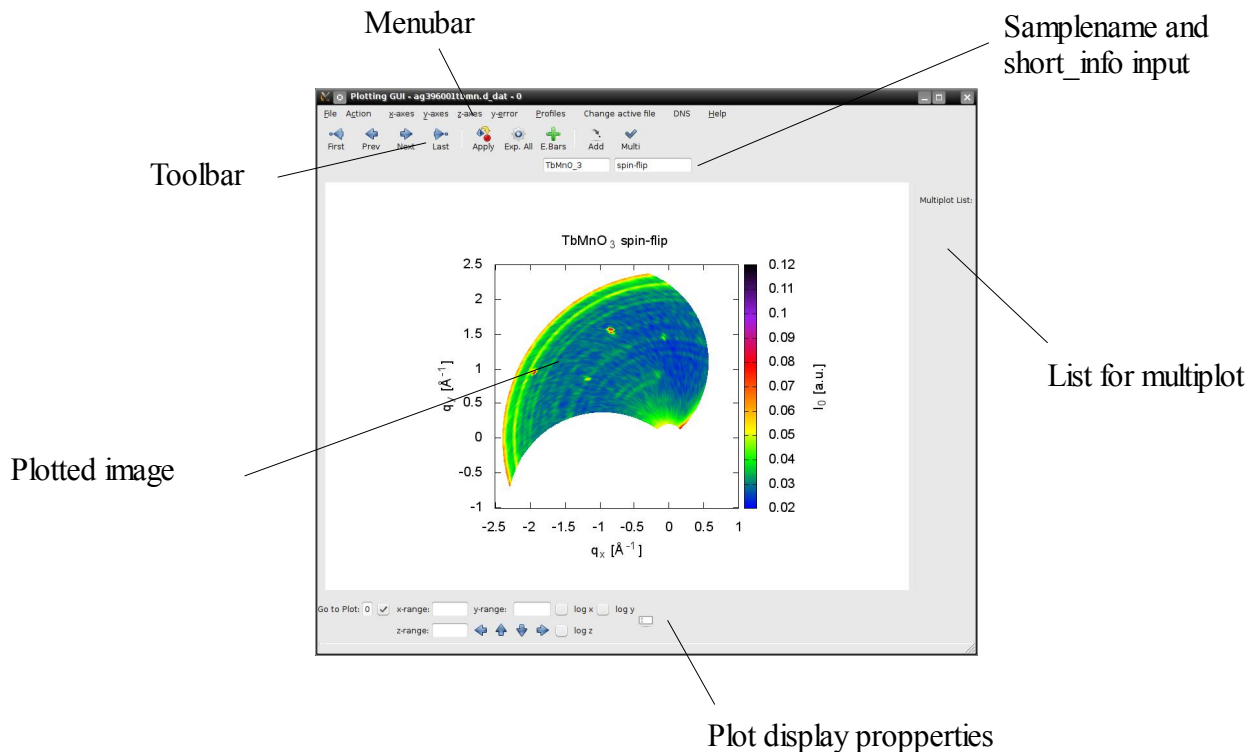
This would open all files starting with test01 and ending with .d_dat, two polarization directions are split and every 20 files belong to one measurement, the sample name for the plot title ist TestName and the file vana.d_dat is used to make the vanadium correction.

```
dnsplot -files a 10 6 0 60 bla.d_dat -files b -10 8 100 200 bb.d_dat
```

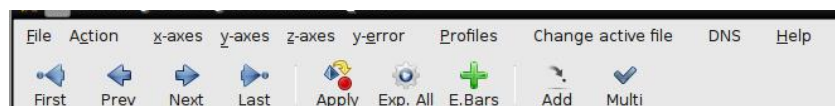
This would open two sets of files, the first with omega offset of 10 and 6 polarizations and the second with omega offset of -10 and 8 polarizations.

2. Overview over the GUI

After starting the GUI should open and look something like this:



2.1 The Menubar an Toolbar:



Most functions are accessed via the menu-bar, the tool-bar buttons are also present inside the menus. The main menu categories are:

-File: Everything for opening and saving/exporting the data/plots.

-Action: Everything to change the plotted Data including e.g. Cross sections, fit routines etc.

-x/y/z -axes, y-error: Change of the plotted columns for x,y,z and error.

-Profiles: Plotting profiles that can be saved/loaded, see 2.2 for more information

-Change active file: A list of files/file packages of the current session, here you can choose another set of Data or the raw data of your current plot

-DNS: Actions that only apply for the DNS session, this is because the program also supports other instruments with different functionalities.

-Help: Will give useful information in the future.

Since most of the menu entries should be self explaining we only focus on some items of the File and Action menu:

File->Save: As the program uses gnuplot for the actual plotting you can export the data of the active plot as text file together with a gnuplot entry file. The files will be called [name]{index}.out and [name].gp

File->Export: Save the plot as picture.

Action->Add/Add all to Multiplot: Add the active / all plots from this file to the multiplot list. When you press the Multiplot button every item in this list will be plot together.

Action->Fit data...: Fit functions to the dataset. This only works for 1d data e.g. powder or cross-sections

Action->Filter the data points: You can define filters to exclude points from the plot

Action->Transform the Units/Dimensions: Transforms physical units. In this dialog the transformation is set as [from-dimension] [from-unit] [multiplier] [addition] → [to-unit] [to-dimension] and will transform every data-column this settings fit to. E.g. if you want to transform all columns containing ° into rad you would enter " '°' '0.0174532925199' '0' 'rad' " .

Action->Cross-Section: Gather all data points along one line, e.g. if you want to make a cross-section along the (1,1) direction starting at (0,0) with a width of 0.01 and combine 5 points to one for better statistics you would enter 1,1,0,0,0.01,5 in the fields of this dialog.

Action->show plot parameters: Shows the file used by gnuplot to create the graph. This includes the header information extracted from the first file of the sequence. This can be helpful to find errors.

Action->Run Macro/Run last Macro: Experimental, not intended for end-users. Expects input as can be found in Help->Action history.

DNS->Omega Offset: Change the offset of omega for single crystal plots.

DNS->Change Increment: Recalculates the plot if the number of polarizations have been given wrong in the command line. (CAUTION: This deletes all cross-sections and plot combinations)

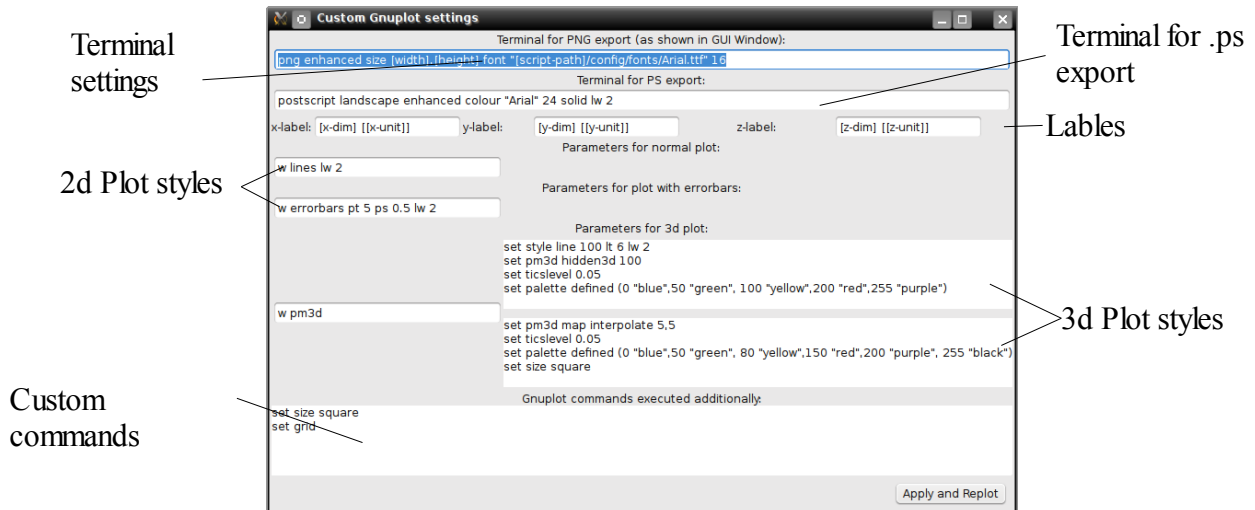
DNS->Separate Scattering: Calculate sum and differences of polarizations e.g. to get the pure magnetic scattering.

2.2 The Plot options:



In the plot options area you can change the appearance of your plot. The x,y and z-ranges are given as in gnuplot by “from:to” e.g. “-12e-3:3” or “:2” for no lower limit.

The Gnuplot customization buttons opens the following dialog:



All of these settings use the standard gnuplot syntax with additional replacement of some settings in brackets by data from the program. All these settings can be saved as profiles to be reloaded later within the Profiles menu. You can check the result Action->show last plot parameters dialog.

3. File Structure and Configuration:

The program's source code is structured as follows:

```
{root}/
  config/
    fit/
    fonts/
    ...
    dns.py
    gnuplot_preferences.py
    ...
  doc/
  .....
  read-data/
    ...
    dns.py
    ...
  sessions/
    ...
    dns.py
    generic.py
    ....
  configobj.py
  file_actions.py
  fit-data.py
  measurement_data_structure.py
  measurement_data_plotting.py
  plot.py
  plotting_gui.py
  setup.py
```

The startig script is plot.py which mostly just loads the appropriate modules. The main backbone of the program is present in :

- measurement_data_structure.py (The class for data storage and treatment)
- measurement_data_plotting.py (The functions for plotting)
- plotting_fui.py (the GUI class with all related functions)
- sessions/generic.py and sessions/dns.py (commandline evaluation and DNS data treatment)
- read-data/dns.py (the functions used to read the raw data files)

For end-users it could be useful to take a look in the config/dns.py and config/gnuplot_preferences.py files, as these contain instrument dependent options and all standard gnuplot settings used for the plotting including the gnuplot startup command.

4. Installing the program on other PC's:

Linux: Extract the .tar.gz file and run a) python setup.py install or b) ./install (see README.txt)

Windows: The Program is known to work in Windows, too. If you like to install it and do not have experience using python pleas contact me for a packaged version for windows, as the installation of all needed packages can be extensive.

Have much fun using the Software!!!