peakfinder manual

Hal Finkel

February 20, 2005

Contents

1 Introduction **3**
- 1.1 Requirements . . . 3
- 1.2 Download . . . 3
- 1.3 Installation . . . 3

2 Usage **4**
- 2.1 Loading Data . . . 4
- 2.2 Calibrating Data . . . 5
- 2.3 Clearing Calibration Fit . . . 5
- 2.4 Printing Data . . . 5
- 2.5 Printing Peaks . . . 5
- 2.6 Printing Peak Information . . . 6
- 2.7 Printing Calibration Information . . . 6
- 2.8 Plotting Data . . . 6
- 2.9 Plotting A Peak . . . 6
- 2.10 General Plotting Options . . . 6
- 2.11 Exiting . . . 7

Index **8**

Chapter 1

Introduction

The purpose of the peakfinder program is to automatically find and fit peaks in histogram-like data (such as gamma-ray spectrum). Additionally, the spectrum can be calibrated if reference data from know sources are available.

1.1 Requirements

peakfinder is written in C and should be compatible with any recent POSIX-compatible system. It requires the following two libraries:

- The GNU Scientific Library (GSL) - <http://sources.redhat.com/gsl/>
- PLplot Scientific Plotting Library - <http://plplot.sourceforge.net/>

Additionally, peakfinder can take advantage of the readline interface if it is available. The GNU Read-Line Library is available from <ftp://ftp.gnu.org/gnu/readline/>.

1.2 Download

The current release of peakfinder can be downloaded from the "Files" section of the project page at <http://sourceforge.net/projects/peakfinder/>.

Alternatively, the latest source files can be retrieved from the CVS repository.

```
cvs -d:pserver:anonymous@cvs.sourceforge.net:/cvsroot/peakfinder login
cvs -z3 -d:pserver:anonymous@cvs.sourceforge.net:/cvsroot/peakfinder co -P peak
```

When prompted for a password for *anonymous*, simply press the Enter key.

1.3 Installation

peakfinder uses an autoconf-based configuration process. The **configure** script must be run in order to detect relevant features of your system and produce the necessary makefiles. Then the **make** program can be used to compile the sources.

```
./configure
make
make install
```

Chapter 2

Usage

To access peakfinder, simply run the **peakfinder** command from a terminal.

```
peakfinder
```

2.1 Loading Data

Data can be loaded using the **load** command. In the current version, only one data set can be loaded at any one time. Loading a new data set will discard any data set currently in memory.

`load "`*`file`*`"`

Note that, as in all commands requiring file names, the file name must be quoted.

```
> load "/path/to/some/file"
```

The data file is expected to be a two-column ASCII (plain text) file. Each line has two numbers separated by one or more space characters. The first number is taken to be the channel number. The second number is taken to be the number of counts in that channel.

```
 0            0
 1            7
 2            0
 3            5
 4            0
 5            0
 6            4
 7            0
 8            4
 9            0
10            2
11            0
12            1
13            0
14            5
15            15
```

```
16              22
17              34
18              43
19              45
20              32
21              17
22              8
23              12
24              2
```

2.2 Calibrating Data

`calibrate using "file"`

The **calibrate** command will attempt to fit the relationship between channel number and some specified calibration units.

The first line of the specified file contains a string specifying the name of the calibration units. The remaining lines each contain two numbers separated by space characters. The first number is the position of a peak in calibrated units and the second number it is relative intensity.

```
keV
121.78  28.4
344.28  26.6
411.12  2.23
778.9   13.0
964.13  14.3
1408.01 20.9
```

The calibration fit will be saved until the program exits or until cleared using the **`clear calibration`** command.

2.3 Clearing Calibration Fit

`clear calibration`

The **clear calibration** command clear the current calibration fit.

2.4 Printing Data

`print data [normalized] [to "file"]`

The **print data** command will print the currently loaded data set to **`file`** or to standard output. If the `normalize` option is provided then the normalized data set is printed.

2.5 Printing Peaks

`print peaks [sorted by [number | height | area]] [to "file"]`

The **print peaks** command will print the identified peak regions to **`file`** or to standard output. Each output line consists of three numbers. The first is the channel number of the center of the peak region. The second number is the starting channel number of the peak region. The third number is the ending channel number of the peak region.

2.6 Printing Peak Information

`print peak` *`peaknumber`* `[to "`*`file`*`"]`

The **print peak** command will print information about the specified peak to **`file`** or to standard output. This command will print all available information regarding the specified peak, including fit parameters for the peak and its underlying background.

2.7 Printing Calibration Information

`print calibration [to "`*`file`*`"]`

The **print calibration** command will print information about the current calibration fit to **`file`** or to standard output.

2.8 Plotting Data

`plot data [`*`general_plotting_options`*`]`

The **plot data** command will plot the current data set.

2.9 Plotting A Peak

`plot peak` *`number`* `[`*`general_plotting_options`*`]`

The **plot data** command will plot an individual peak. The current fit to the peak and the background will be graphed on the plot.

2.10 General Plotting Options

```
[[channel] start to [channel] end] [normalized] [marked] [annotated]
    [calibrated] [rescaled] [rotated degrees] [to "file"] [driver "driver"]
```

The domain can be specified using the **`start to end`** syntax. It is assumed that **`start`** and **`end`** are in calibrated units unless they are preceded by the word **`channel`**. It an output file is specified, the file name is used to guess the correct driver. If a guess cannot be made, or no output file is specified, the `xwin` driver is used. The plot can be rotated by an arbitrary angle using the `rotated` option followed by the number of degrees to rotate the plot.

`normalized` Plot normalized data instead of raw data

`marked` Non-background regions to be shaded on the plot

`annotated` Print the peak number near the top of each peak

`calibrated` Use calibrated units on the a-axis instead of channels

`rescaled` Rescale the y-axis based on the data in the specified domain

TIP

When plotting small peaks, use the `rescaled` option.

Refer to the PLplot documentation for valid driver names. Common ones are `xwin`, `ps`, `psc` (ps in color), `jpeg` and `png`. Note, when using the `xwin` driver, the output file name refers to the name of the X11 terminal (the default is taken from the environmental variable `DISPLAY`).

2.11 Exiting

`exit`

`quit`

The **exit** command and the **quit** command will exit the program.

Index

annotated, 6

calibrate, 5
calibrated, 6
calibration file format, 5
clear calibration, 5
configure, 3
CVS, 3

data file format, 4
domain, 6
download, 3
driver, 7

exit, 7

GSL, 3

load, 4

make, 3
marked, 6

normalized, 5, 6

plot data, 6
plot peak, 6
PLplot, 3
print calibration, 6
print data, 5
print peak, 6
print peaks, 5

quit, 7

range, 6
readline, 3
rescaled, 6
rotated, 6