Appendix C

Plotting with `physica`

An integral part of every lab is an analysis of the results, and it is best done with the help of a scientific visualization/plotting/fitting computer program. There is a large number of such programs for different computing platforms. If you are comfortable using one such package already, you may use the software you already know. However, bear in mind that:

- the software must be able to perform multi-parameter non-linear fits, and a proper statistical evaluation of convergence (*e.g.* χ^2);

- you must bring your own laptop computer to the lab;

- the instructor may not be able to help, not being familiar with the quirks of your software.

What is made available to you in the lab is a powerful scientific plotting and fitting package called `physica`, written at the TRIUMF accelerator in Vancouver, BC. This is the recommended software for use in the analysis of experimental data and in the preparation of lab reports, theses, and scientific articles.

The main `physica` "engine" is an "old-fashioned" piece of software in the sense that it has a command language and requires typing of commands at the prompt, and not clicking a mouse and using visual widgets. On the other hand, it is easy to learn, its numerical engine is an extremely powerful one, and a macro language allows you to automate many tasks using only a text editor. In order to harness the full power of `physica` you may need to spend some time learning its command language.

In addition, *Physica Online* is a web-based interface into `physica` which may prove adequate for most tasks. It is fairly self-explanatory and can be invoked by pointing a web browser to
<div align="center">www.physics.brocku.ca/physica/</div>
For more advanced tasks, the web-based *Physica Online* provides the "expert mode" which does allow access to full capabilities of `physica`.

A stand-alone version of *Physica Online* is also installed on all the Linux machines in the Physics cluster under the name of `PhysicaLab`. It is a local Tcl/Tk script that acts as an interface into the same "engine" that drives the web-based *Physica Online*.

Recently, a new, graphical user interface version of `physica` called *eXtrema* has become available from `exsitewebware.com/extrema/`, in both Linux and Windows versions. You may want to download and install it on your home computer.

On-line `physica` tutorial

A quick way to get into `physica` is through the on-line tutorial created here at Brock.

- log on to a Linux workstation;

- open a web browser and an 80x24 shell window (a terminal icon) side-by side; point the web browser to

  `www.physics.brocku.ca/doc/physica/`

  and type `physica` in your shell window; a separate graphical output window will open up, and the shell window will display the `PHYSICA:` prompt; proceed at your own pace.

- You will likely want to use your favourite text editor to create small macro command files. You may want to arrange all windows side-by-side for convenience. Remember to **not** resize the graphics window of `physica` with a mouse (use a `resize` command at the `PHYSICA:` prompt).