Developing Software for the Beam Line Control Systems

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1. INTRO TO XAS

X-ray Absorption Spectroscopy is a technique used by biologists, geologists, paleontologists, and many other scientists around the world to examine the chemical components of a particular object of interest. XAS experiments have allowed scientists to develop new drugs in the medical field, find ways to increase energy efficiency, answer questions regarding historic events, and overall has been a great use in the scientific community.

2. REGIONS

In a typical XAS experiment, the incident X-ray beam energy is varied in a region close to a fundamental electronic transition of the atom(s) of interest. The data has to be collected most densely in the immediate vicinity of the transition (also called edge). XAS scans are therefore often comprised of differently dense regions where the first region is coarse (wide steps), the second region is dense (narrow steps), and the third region exponentially goes from dense steps to wider steps. See Figure 2.

3. PROBLEM/SOLUTION

The user can define how the data will be collected in each region by typing commands on the beam line console which features a command line interface (CLI). However, this is an inefficient method because it can be a lengthy, tedious, time consuming, and overall unpleasant process for those who are not computer experts. To facilitate this process we designed a graphical user interface (GUI) that has all the necessary components for the user to define each region by simply typing in textboxes and using the mouse to click on labeled buttons which execute the desired event.

4. WHY PYTHON?

Use of Python to implement the Region Editor Software

Python was chosen for its rapid prototyping ability, its customary use at SSRL, and a great availability of GUI and scientific libraries. Unlike Matlab®, Python is an open-source, free language and software developed in Python can be given to the users for personal use.

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