

# Spallation Neutron Source Data Analysis

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[http://www.csm.ornl.gov/Internships/rams\\_07/abstracts/j\\_traverso.pdf](http://www.csm.ornl.gov/Internships/rams_07/abstracts/j_traverso.pdf)

## Introduction

The Spallation Neutron Source (SNS) is a state of the art accelerator-based neutron source at Oak Ridge National Laboratory (ORNL) that was officially completed in May of 2006. When at full power, the SNS will produce the most intense pulsed neutron beams in the world which will make it the best facility for conducting neutron scattering research. With neutron scattering, scientists are able to study the arrangement, motion, and interaction of atoms in materials. Neutron scattering research has led to improvements in medicine, food, electronics, cars, airplanes, and improvements in materials used in high temperature superconductors, powerful light weight magnets, aluminum bridge decks, and stronger, lighter plastic products. These types of improvements would not be possible without a means to analyze the data obtained. The purpose of this project is to make a graphical user interface (GUI) for the instrument scientists to use to analyze their data. The GUI is for the NL2SOL fitting code which is being tested to fit experimental backscattering data from the SNS.

## The Fitting GUI

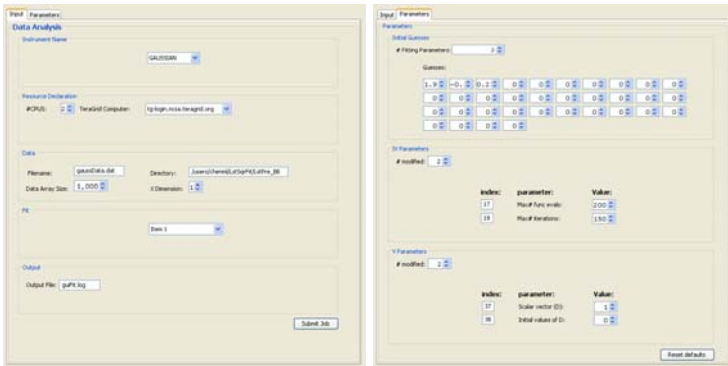


Fig. 1. User Input Page

Fig. 2. Parameter Page

- Built from scratch using NetBeans IDE 6.0
- Code generated by each component
- Made functional with custom Java code
- Figure 1- User inputs information about data and fit
- Figure 2- User can adjust parameters

## SNS Portal

- GUI will be added to simulation tab in SNS Portal
- Experimental data will come from instrument to SNS portal

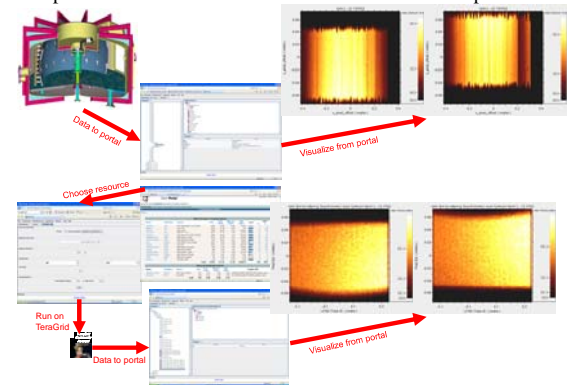


Fig. 4. Data path

\*This is just an example. It is not the GUI I created.

- Scientist at portal will choose and submit program
- Instrument scientists can fit data without having to know anything about NL2SOL, the TeraGrid, or parallel computing
- Input sent to TeraGrid on community account
- Sent back to portal for visualization of fitted data

## The TeraGrid

- Input sent to the TeraGrid, a network of supercomputers, from SNS portal
- NL2SOL run on parallel processors



Fig. 3. TeraGrid Facilities Map

- San Diego Supercomputer Center
- National Center for Atmospheric Research
- Texas Advanced Computing Center
- National Center for Supercomputing Applications
- University of Chicago/ Argonne National Lab
- Purdue University
- Pittsburg Supercomputing Center
- Indiana University
- Oak Ridge National Lab

## Future Work

- Make program available for more instruments
  - BASIS, SEQUOIA, and HYSPEC in near future

- Make more fitting types available



Fig. 5. Backscattering Spectrometer (BASIS)

- Make more components editable
  - To allow for more customized fitting

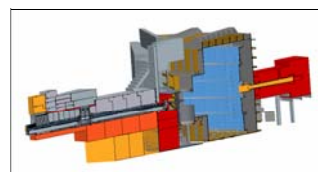


Fig. 6. Fine-Resolution Fermi Chopper Spectrometer (SEQUOIA)

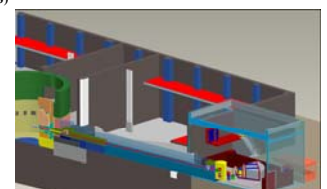


Fig. 7. Hybrid Spectrometer (HYSPEC)