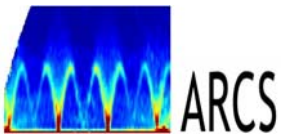

ARCS User Operation Manual

M. B. Stone

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Objective

The objective of this document is to familiarize users with the ARCS data acquisition system (DAS), how to access data, and preliminary reduction of ARCS data.

Users are encouraged to contact members of the instrument staff with any questions that arise before, during and after the experiment, and to avail themselves of the help of other support personnel when on site to gain access to resources needed for a successful use of the facility.

The DAS

The data acquisition system (DAS) controls the instrument and saves the acquired data. The control of the DAS is performed from the instrument control computer. Please do not use this computer for any other purpose (web browsing, calculating, email, etc.). Here we present an overview of how to use the DAS graphical user interface (GUI) to adjust instrument parameters and acquire data. Each GUI has a shortcut on the desktop of the instrument control computer. A Python based scripting interface is also available for the DAS. Please work with the instrument scientist to implement scripting of the DAS.

The DAQ window

The DAQ window (Figure 1) is used for starting, stopping or pausing measurements (buttons on right side of window) manually or via scripting. The DAQ window is opened from the DCOMClient shortcut on the instrument computer desktop. Very simply, one can manually perform a measurement by pressing "Start", waiting for a given time, accumulated proton charge or monitor counts, and then pressing "Stop". A dialog box will ask you if you want to save the data, and to provide some text describing the measurement. The DAQ window also provides statistics regarding the current proposal, run number, and the current run being acquired. Several tabs are also available at the bottom of the DAQ window. These switch between different windows on the bottom half of the DAQ window.

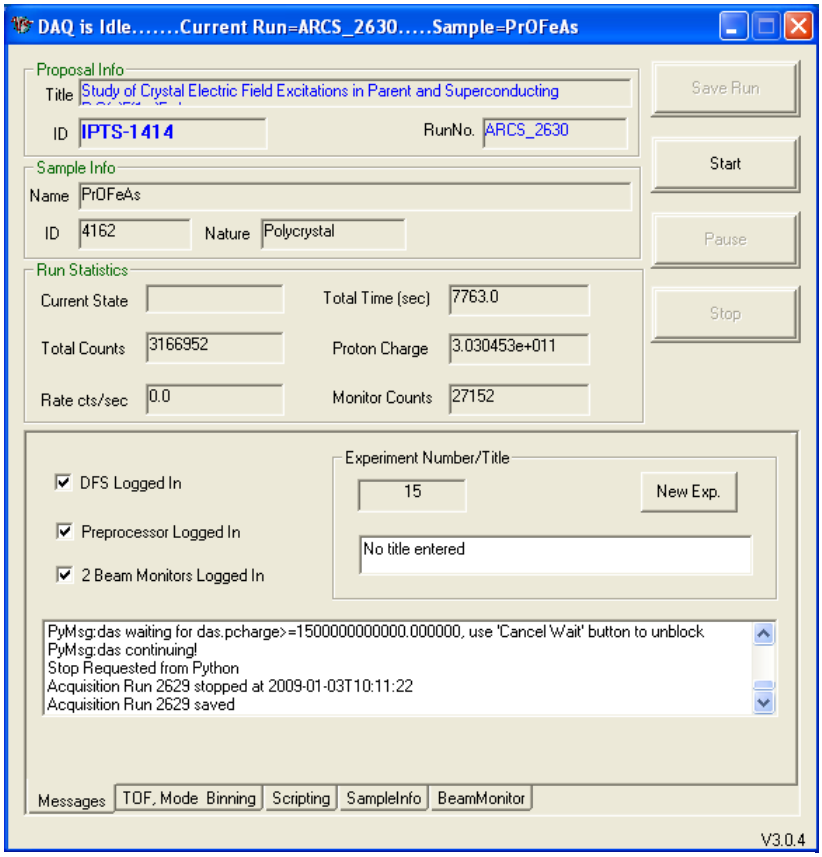

Figure 1. DAQ window with Messages tab selected.

The Messages tab window (shown in Figure 1) provides feedback of the progress of which runs were saved, the motion of motors, or other DAS activities.

The Scripting tab window (shown in Figure 2) allows one to choose from a set of Python acquisition scripts (pull down menu on the left side of the window). Once a script is chosen from the pull down menu, the "Make Selection Current" button must be clicked, and the "Use Script" box must be checked. When this is done, the "Start" button on the top half of the DAQ window will change to "Start Script". Please work with the instrument scientist to implement scripting of the DAS specific to your experiment.

The Beam Monitor tab allows one to see the current beam monitor statistics for ARCS beam monitors 1 and 2. Other tabs and functionality of the DAQ window will not be used under normal user operations.

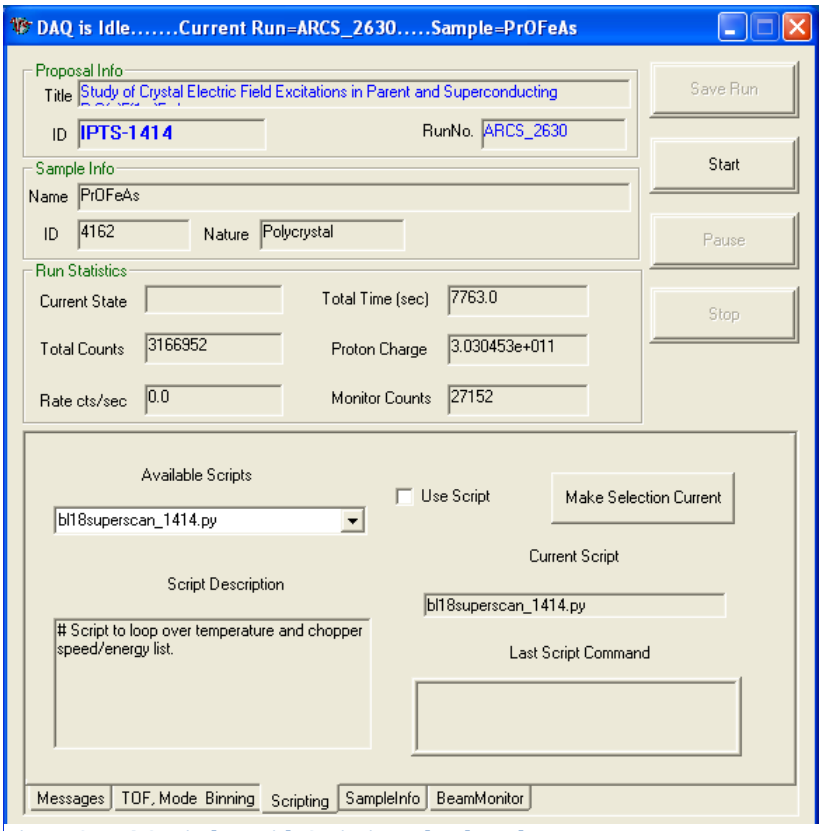

Figure 2. DAQ window with Scripting tab selected.

The MultiHisto window

The MultiHisto window also appears when the DCOMClient shortcut is chosen from the desktop. This window is shown in Figure 3, and provides immediate visual feedback to the progress of the measurement. The two-dimensional contour plot shows the scattering intensity measured by the ARCS detector array integrated over all time-of-flight. The ARCS detector array is viewed as from the sample position. The beamstop is plotted at approximately (250, 191) in the (x, y) coordinates of the figure. One can use these data to determine detector packs which are not operating properly. The bottom two plots, X cross-section and Y cross-section, show the intensity across the horizontal or vertical dimension of the detector array. Once can also enable a cursor by choosing "show cursor". This will place a cursor on the detector array image plot, and show the corresponding cross-sections in the two one-dimensional plots. A region of interest can also be selected using the "Region of Interest" tick-boxes. Note that the plotted region of interest in the X and Y-cross section does not update every time a new region is chosen. To have the region of interest cross sections update when they are changed, one must start a new acquisition.

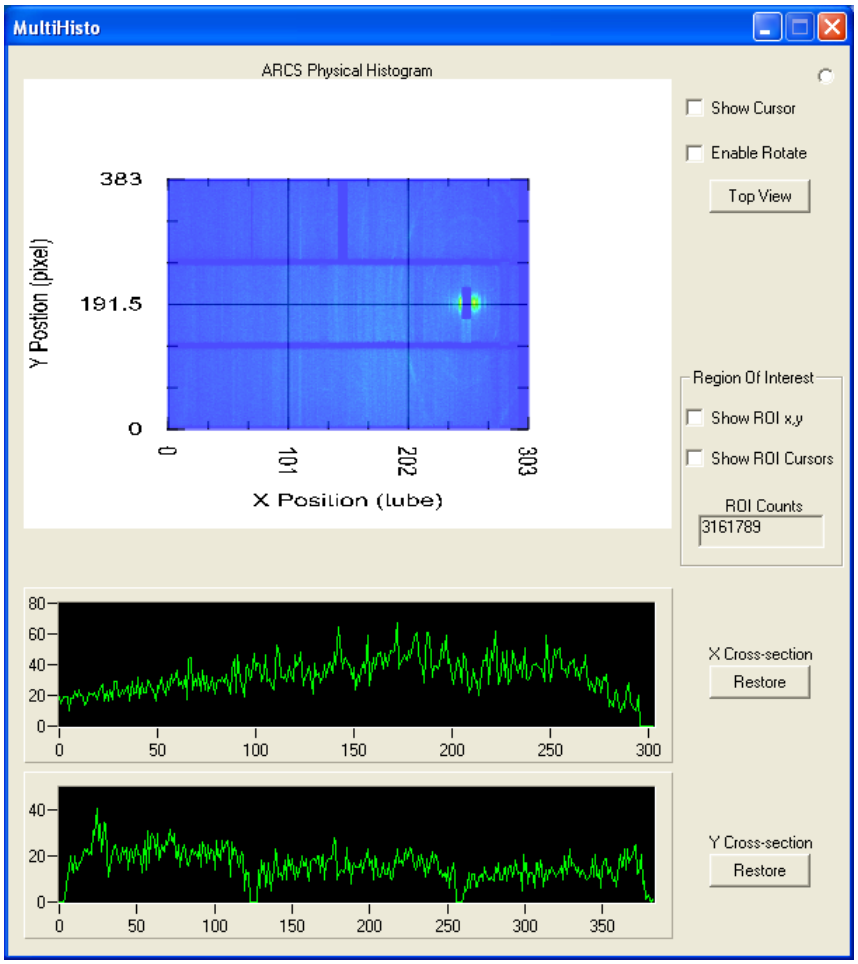

Figure 3. The MultiHisto window.

The MultiGraph window

The MultortiGraph window also appears when the DCOMClient shortcut is chosen from the desktop. This window is shown in Figure 4, and plots the total integrated detector counts as a function of time-of-flight or d-spacing, depending upon which option is selected in the window. One can also show this

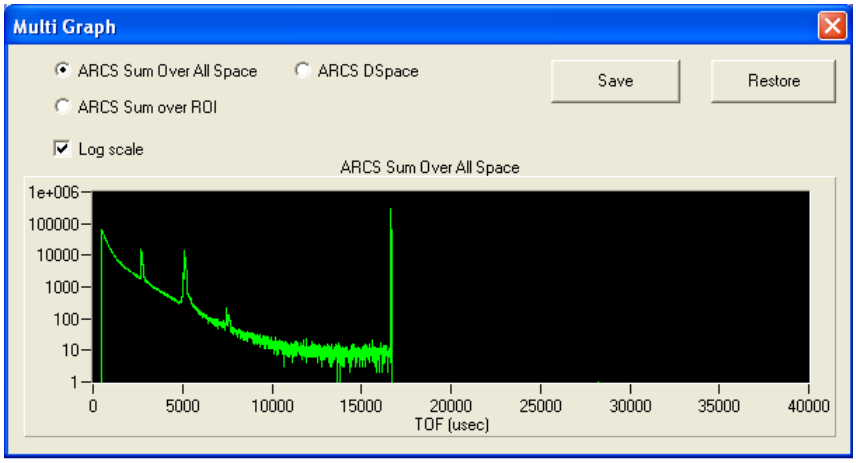

Figure 4. The Multi Graph window.

information for the corresponding region of interest chosen in the MultiHisto window. The “Restore” button restores the default options of the window. If interested, these data can be saved to a text file using the “Save” button.

The Motors App window

The motors application window is chosen from one of the desktop shortcuts. This window is shown in Figure 5. The options available from this window allow one to adjust the instrument slits ("Slit 1"), adjust the Fermi-chopper translation table ("Positions"), and to choose fixed positions of the Fermi-choppers ("Select Chopper"). One should only have one chopper spinning at a time. The chopper translation table can be moved while a Fermi-chopper is spinning. "Select Chopper" allows one to choose, chopper 1, chopper 2 or no chopper (white beam option). Additional functionality of this window will be available as more motors are added to the instrument and instrument control.

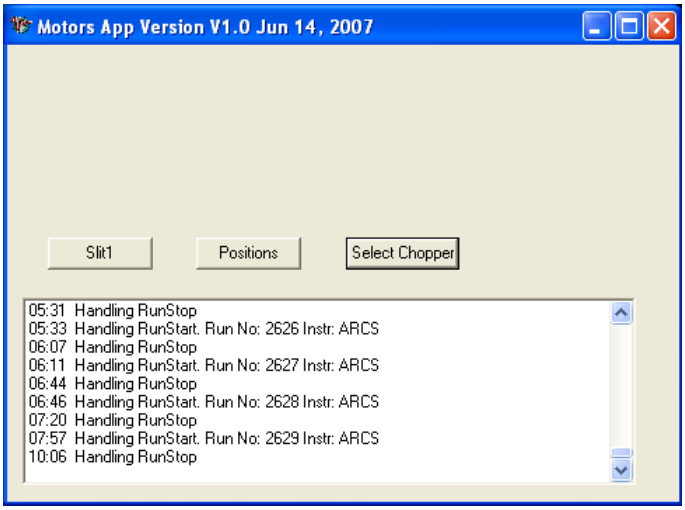

Figure 5. Motors App window

The Chopper control App

The Fermi chopper control application is also available as a shortcut on the instrument control computer's desktop. The corresponding window is shown in Figure 6. From this window, one can choose the frequency in Hz and the energy in meV of each of the two installed ARCS Fermi choppers. Please work with your instrument scientist or local contact to determine the appropriate Fermi chopoper, frequency and energy for your experiments needs. Do not spin more than one Fermi chopper simultaneously. One can spin one chopper down to zero Hz, while the other chopper is accelerating to its run frequency. This window also provides feedback as to the actual chopper speed and energy.

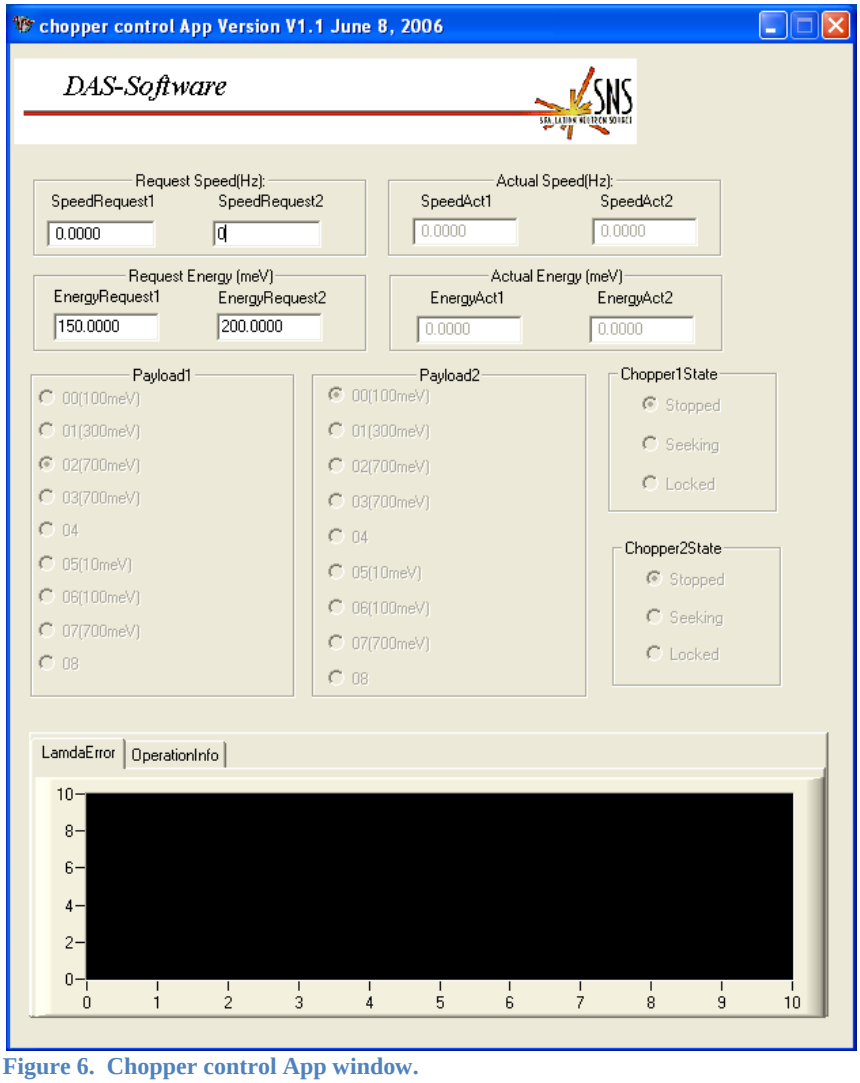

Figure 6. Chopper control App window.

Lakeshore App Window

The Lakeshore App window is also available from a shortcut on the desktop of the instrument control computer. The Lakeshore App Window is shown in Figure 7. This application is used with most of the variable temperature sample environments available at ARCS. One can enter a requested temperature "SampleTempRequest" and set a tolerance window (+/-) for this requested temperature "TolRequest". The current sample temperature "SampleTemp", the current status of this temperature "SampleTemp_Status" and the current setpoint, "CurrentSP" are also shown in this window. A plot of the temperature as a function of measurement time is also shown in the bottom portion of the window, along with a dialog of recent DAS events.

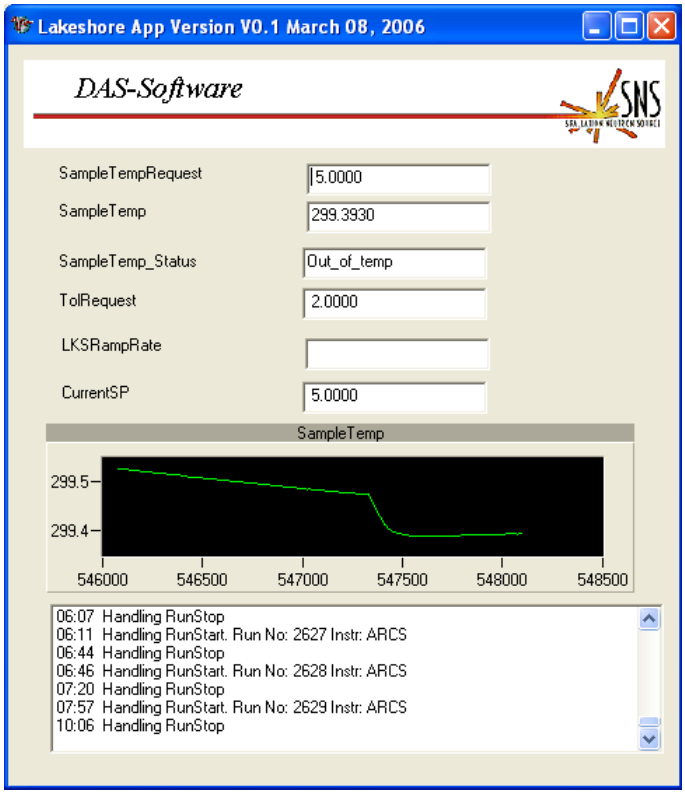

Figure 7. Lakeshore App window.

Beam status windows

One of the most important DAS windows is the beam status window. This is a single window with a "Beam Off" or "Beam On" icon and corresponding beam current displayed in the window. These corresponding windows are shown in Figure 8.

Figure 8. Beam status windows

Data Access

To access and perform preliminary reduction of ARCS data, one should make certain that one can access both the Neutron Scattering Portal and the ARCS analysis machines (ARCS1 and ARCS2). Your data will be available both via the Neutron Scattering Portal and via the ARCS analysis machines and is organized by facility, instrument and your proposal number (IPTS number). We outline here the steps which you should proceed through in order to access your data. More information is available at http://neutrons.ornl.gov/portal/ and the respective FAQ page for Portal users

https://neutronsr.us/help/FAQ/user/. The end of this document also includes a "New User Data Analysis Checklist" which summarizes these steps.

Neutron Scattering Portal access

All user data on the SNS file system can be remotely accessed via the neutron scattering portal (http://neutronsr.us/portal/). This website is accessed via a java enabled browser, and requires an XCAMS log in. The portal allows you to access your data exactly as it appears on the SNS file system, and also provides visualization abilities for data files as well as access to software and portal applications. Files can also be downloaded directly from the portal by using the file menu. One should first make certain that they can access the Neutron Scattering Portal. To use the portal one must have an XCAMS account. Go to https://xcams.ornl.gov/xcams/regStep1.shtml to request an account. XCAMS is the ORNL computer user authentication system designed to support external, or non-facility personnel. Verify that you can logon to the portal. Start from https://neutronsr.us/portal/ or http://neutrons.ornl.gov/portal/. If you are not on the original proposal for the beam time, you will not have access to the data. If this is the case. email your instrument scientist to make certain that you are associated with the proposal (IPTS number). Figure 9 shows a view of a web-browser accessing the neutron scattering portal.

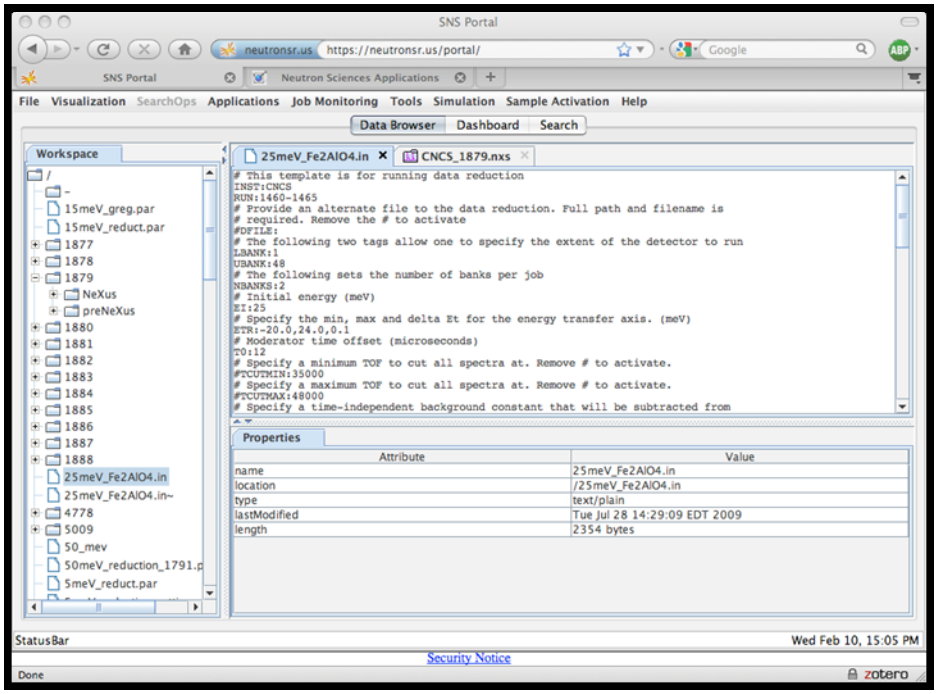

Figure 9. View of web-browser based access of the Neutron Scattering Portal

ARCS1 and ARCS2 analysis machine access

ARCS1 and ARCS2 are the Linux analysis machines available to users for transforming raw data, data reduction, and data visualization. These machines are available at the ARCS instrument cabin. One must apply for use of these resources: go to https://neutronsr.us/accounts/request.html, and choose SNS user, then choose the ARCS instrument and provide the IPTS number of your experiment. This approval requires action on the part of an instrument scientist or a member of the computing staff.

Remote Access of ARCS1 and ARCS2 analysis resources

The ARCS1 and ARCS2 analysis machines are not directly available to external users. Users can use a remote-desktop application called NX which provides a desktop to a computer server named outback (fairgate is a backup system one can use). One can then SSH to the ARCS1 and ARCS2 machines to use

the ARCS data reduction tools. More information on downloading the NX software and setting up remote access to the outback and fairgate machines is available at https://neutronsr.us/help/nx/.

A browser plug-in is available to provide an interface to the analysis applications through the web browser, without logging into the file system directly. Applications available in this manner are found in the portal under “Applications” menu.

More information about the neutron scattering portal and computing resources is available at

- https://neutronsr.us/help/FAQ/user/
- https://neutronsr.us/help/

Data Reduction

Currently, ARCS uses both the DGS (direct geometry spectrometer) data reduction available on the analysis machines or via the portal, or the reduction routines based upon the DANSE project. More information on DANSE is available at http://wiki.cacr.caltech.edu/danse/index.php/Main_Page. Please work with your local contact in the preliminary analysis of your data.

Further information concerning the DGS data reduction routines and the reduction routines based upon the DANSE project are available in the corresponding manuals.

New User Data Analysis Checklist

New User Data Analysis Checklist – to be completed by instrument staff member when registering new user.

Done	Action
	User obtains an XCAMS account (or recover old username and password if already registered): https://xcams.ornl.gov/xcams/regStep1.shtml
	User requests access to the instrument computing resources (do this on a Windows machine). • Go to: https://neutronsr.us/accounts/request.html • Select SNS user (on-site and off-site) • Select appropriate instrument, and enter proposal ID or other reason requiring access. • Press submit. • Enter UCAMS/XCAMS user name and password. • Instrument staff or member of scientific computing must approve access request before proceeding.
	Instrument staff adds user to the proposal (this step requires a java enabled browser): • Go to: https://neutronsr.us/SNSProposalCheckin/ • Select SNS from Facilty List • Select instrument from dropdown list. • Enter the proposal ID in the box. • Press “Get Users for this Proposal” • To add user to the proposal, click “Add Another Row for new user” • Enter their user name and XCAMS ID in the spaces provided. • In the Add/Delete column, click on the space and then choose “Add” from the dropdown menu. • When all users have been added, click “Update Users for Specified Proposal”.
	Verify user can log onto analysis machine – log in with XCAMS username and password.
	If using DGSreduction hard mask, copy appropriate mask files into user home area.