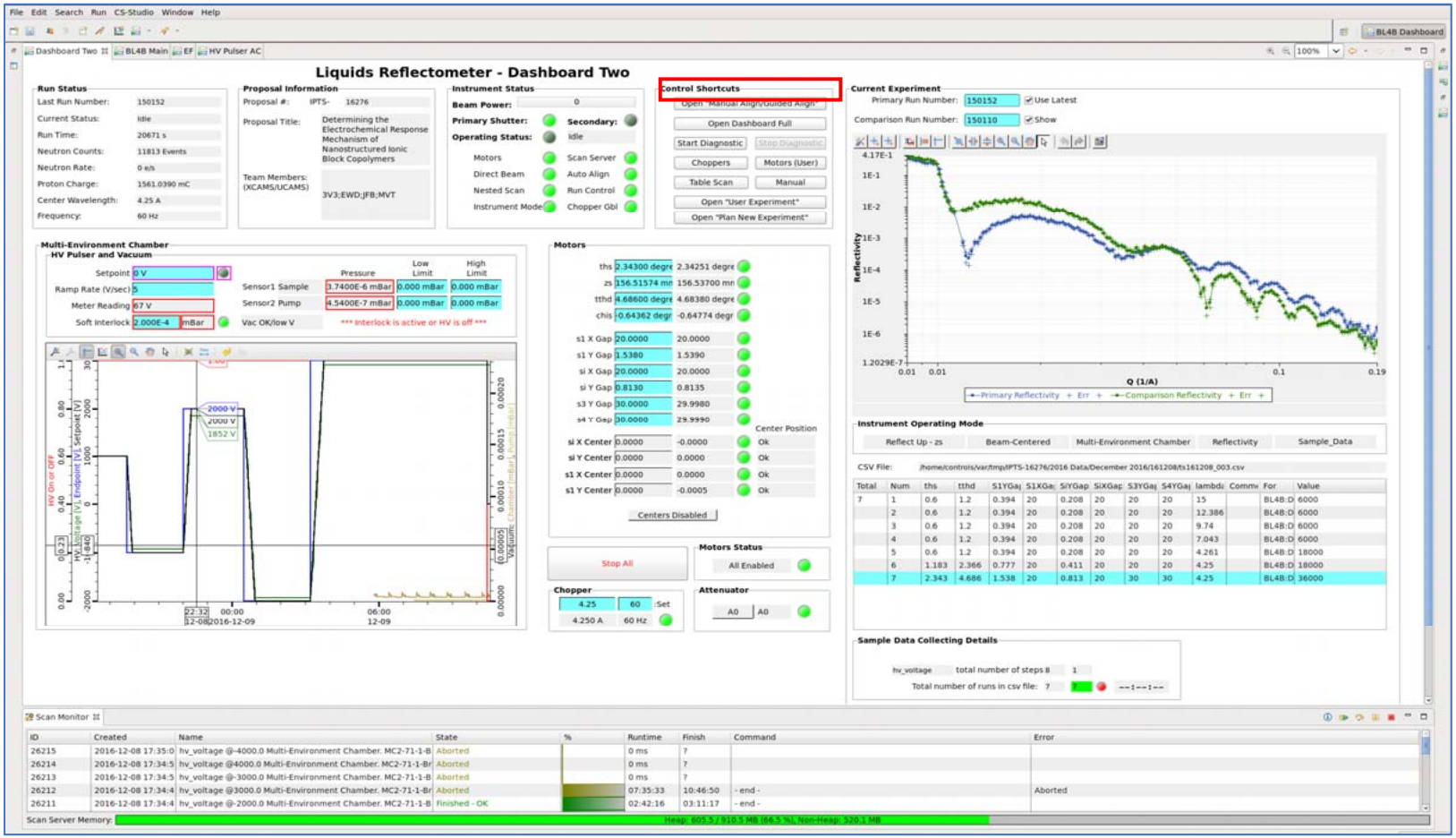
The Data Acquisition System of the Liquids Reflectometer

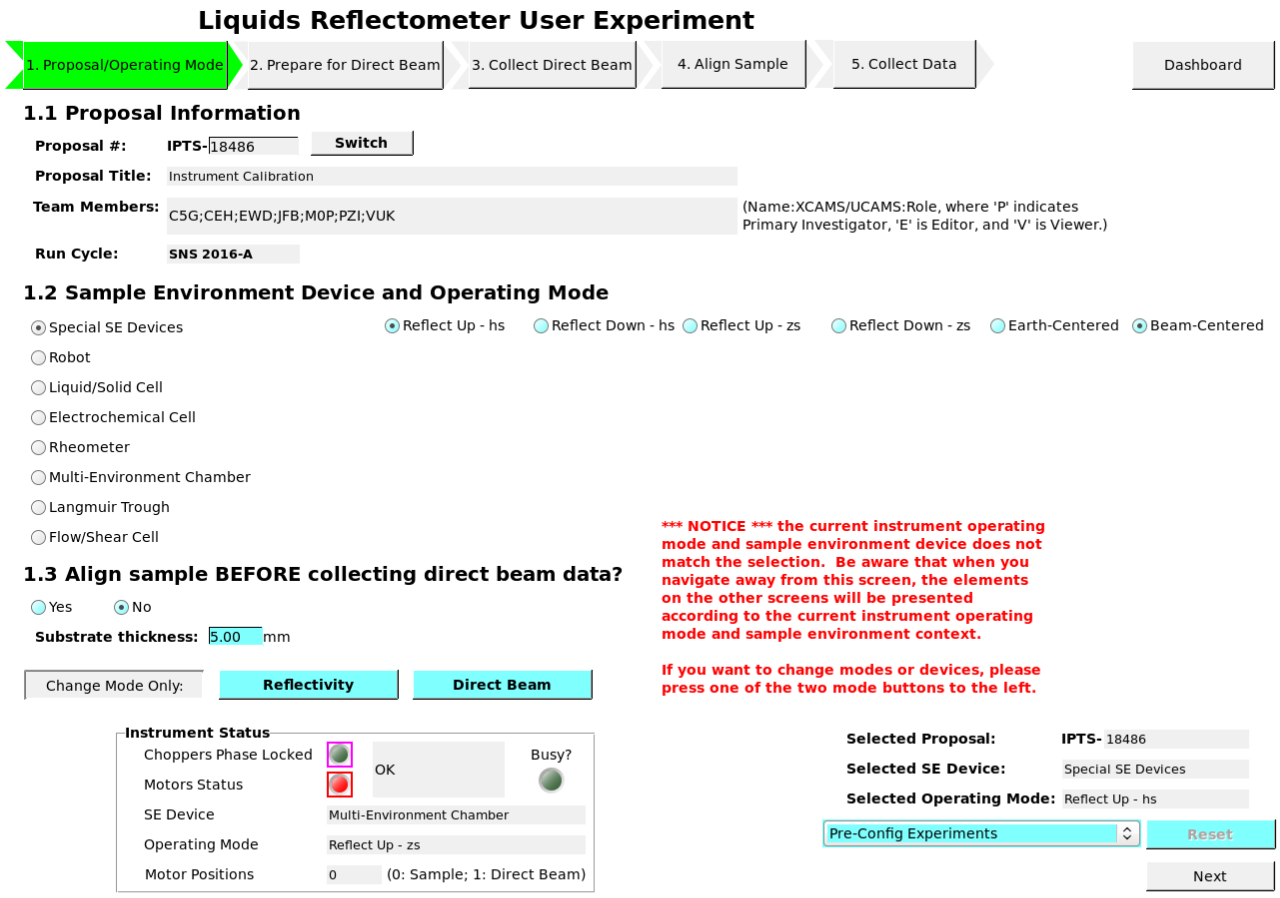
Candice E. Halbert
28 February 2018

Ensure that CSS control is opened on the OPI computer. If not, click the CSS control icon on the desktop.

The view below shows the Dashboard, where you can monitor your sample data collection, change motor positions, change chopper settings, monitor beam power and observe the status of the various components of the instrument.
Liquids Reflectometer User Experiment tabs



Click the “User Experiment” button in the Controls Shortcuts area of the screen to run your sample. You will then be presented with the view shown below.

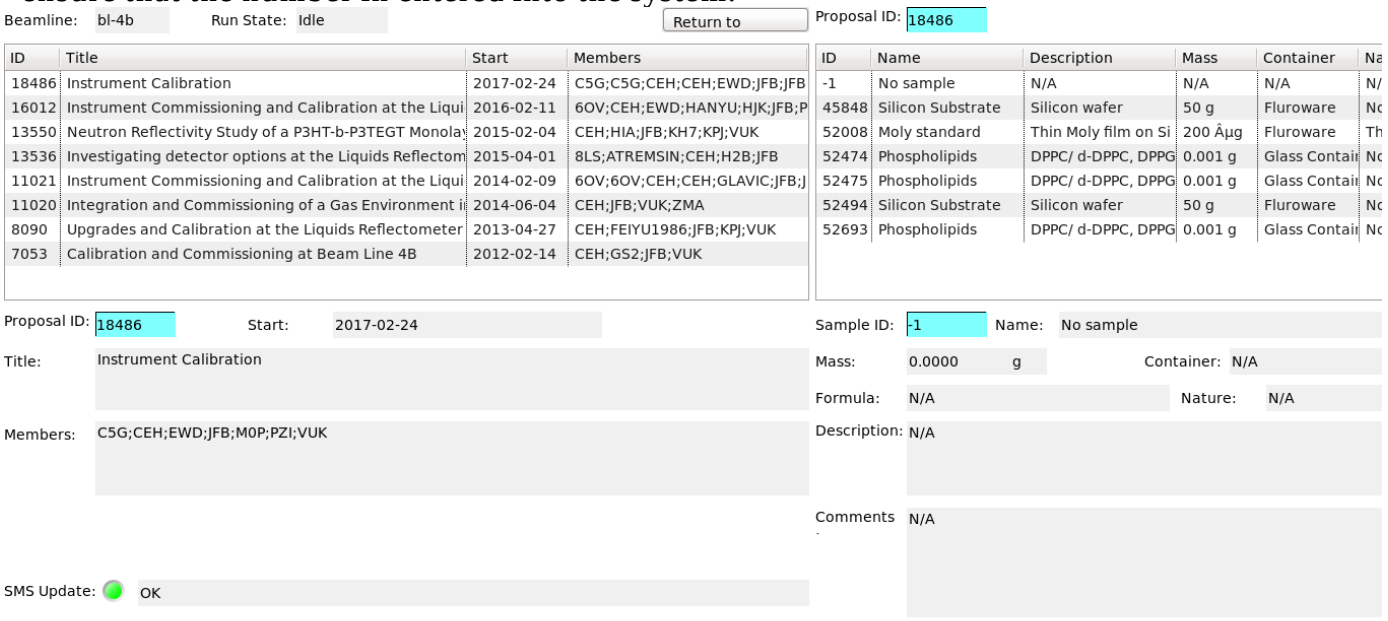


1. Proposal/Operating Mode

This tab is where the current experiment, users, run-cycle sample environments, and operating modes are set.

1.1 Proposal Information

1.1.1 Users and staff can change the IPTS numbers for the experiment, by clicking the “Switch” button, type in the IPTS number that has been approved for your experiment into the blue box, Proposal ID, and press enter to ensure that the number in entered into the system.



1.1.2 One can also double click their proposal number if it is listed on the page. Click the “Return to” button to exit from this view. This will take you back to the Liquids Reflectometer Dashboard. Click the Open “User Experiment” button in the Controls Shortcuts area of the screen to go to back to the Liquids Reflectometer User Experiment tabs view

1.2 Sample Environment Device and Operating Mode

1.2.1 This is where the sample environment that will be used for your experiment selected.

1.2.2 Click the environment you are using and this click whether reflectivity is up or down.
1.2.3 If you have an environment that is not listed, select Special SE Device.

1.3 Align sample BEFORE collecting direct beam data?

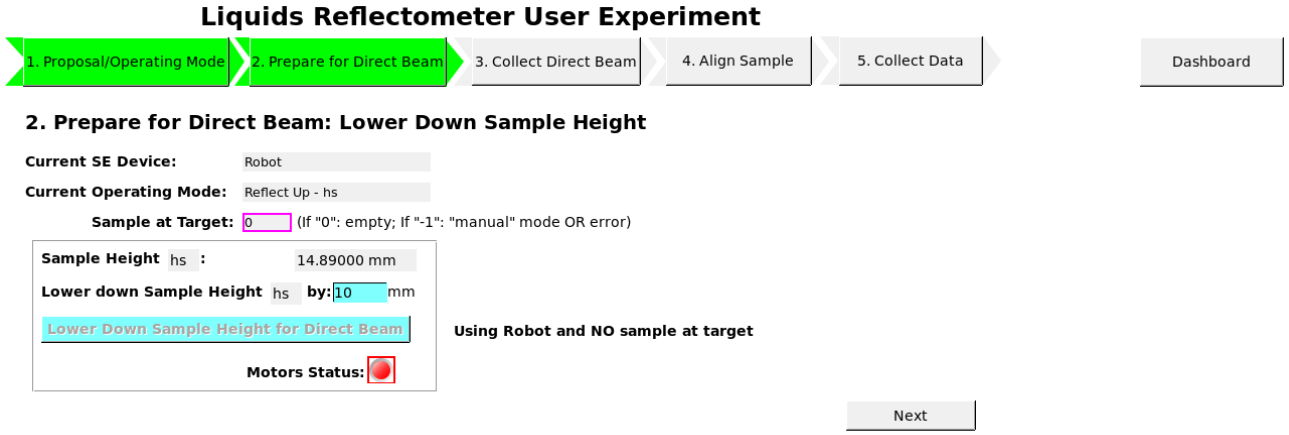
1.3.1 You can setup to align your sample before collecting direct beam, for samples that have to do data collection thru media beside air, by selecting yes in this step; change the motor position for the instrument based on pre-settings for the sample environment selected, and change modes without changing motors.
1.3.2 To Change Mode Only: this will change the mode of the experiment that will affect the operating state of the instrument.
1.3.2.1 In order for the mode to change you will have to click the **Reflectivity** or **Direct Beam** buttons
1.3.2.1.1 **Reflectivity** is when you are collecting data on your sample. This is needed so that the auto-reduce works.
1.3.2.1.2 **Direct Beam** should be selected when collecting direct beam scans. This will make all buttons live in tab 3.
1.3.2.1.2.1 This is important to select correctly so that the auto-reduce know which files to use to normalize the reflectivity data.
1.3.2.2 If you click the Change Mode Only button it will turn into a HOME button, which will move motors of the instrument to pre-sets for the selected sample environment.
1.3.2.3 Click

Click **Next** to move on to the next step. You can click on any of the tabs at the top of the page when every you like to gain access that step.

2. Prepare for Direct Beam

This tab is used to change the height of the sample, if a sample is on the goniostat, so that we can run direct beams through air or sample media.

2.1 If no is selected on step 1.3 then tab 2 will load a preset height value based on the sample environment selected. Click **Next**.

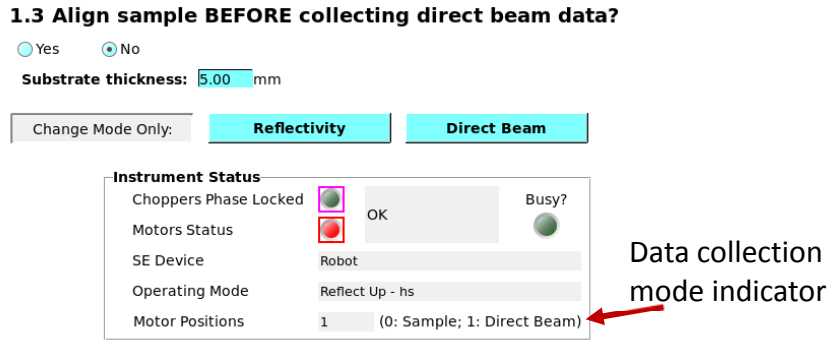


2.2 If yes was selected on step 1.3, then tab 2 will display a view for auto or manual (assisted) alignment

3. Collect Direct Beam Runs

This step is mostly done by instrument staff and experienced users.

3.1 Please follow step 1.3.2 by ensuring that the instrument is in the Direct Beam motor positions.



Once this has been changed, click the **#3 Collect Direct Beam** button at the top of the page

3.2 Direct beam runs collection plan:

3.2.1 Click the folder on the collected direct beam runs using .csv file line to select the direct beam sequence you want to run.

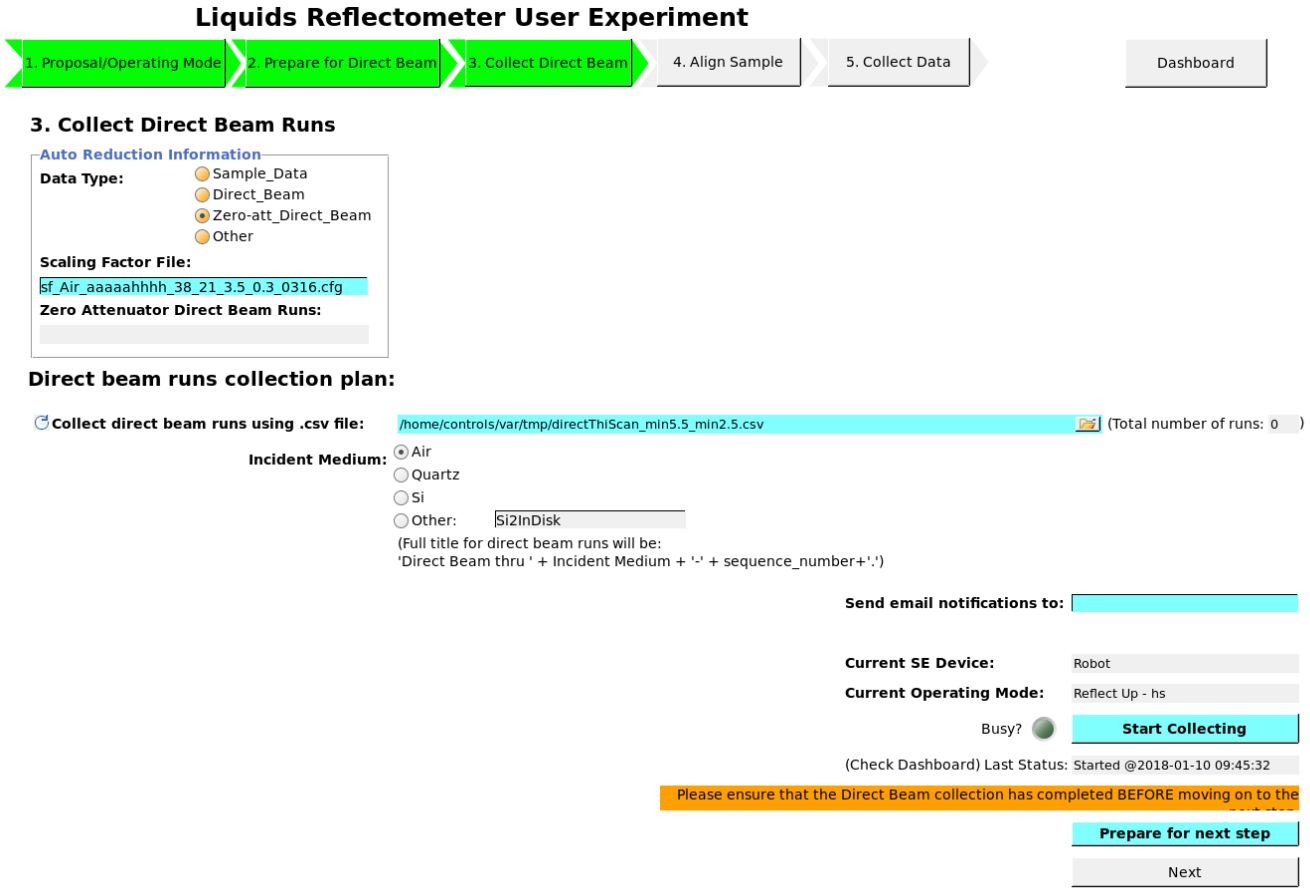
3.2.1.1 The run files are located in the /home/controls/var/tmp/ folder in either the 30Hz_Scans, 60Hz_Scans or Liquid Scans folders

3.3 Select the “Incident Medium”

3.4 Enter email address you’d like notifications to be sent to in the “Send email notifications to:” box and press ENTER after you input the information.

3.5 Ensure that the sample is at the correct height before starting the direct beams if one is on the goniometer.

3.6 Click **Start Collecting** to collect the direct beams



3.7 Once the direct beam scan is completed, return to step 1.3.2 and change the data collection mode to **Reflectivity.**

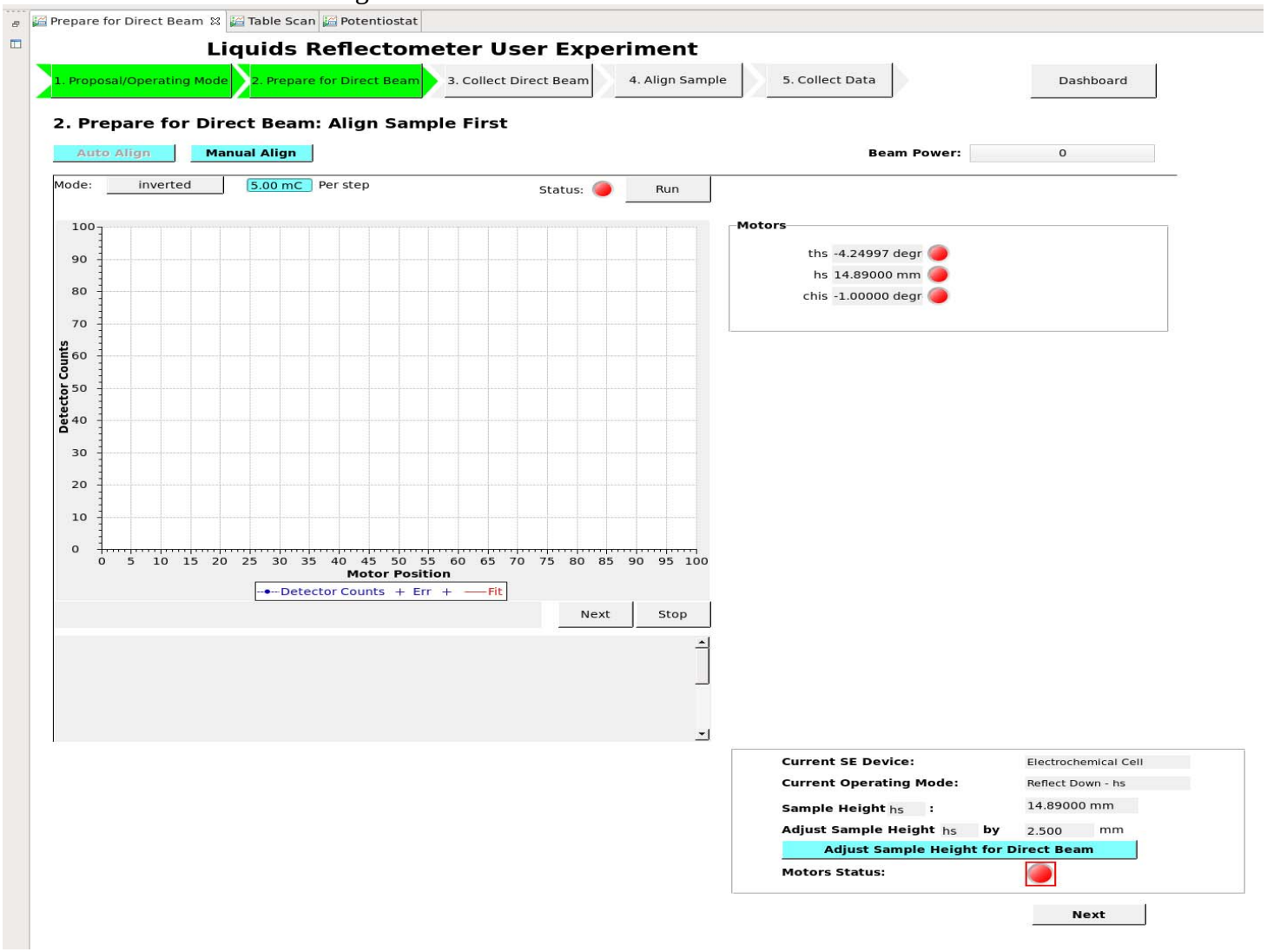
4. Align Sample

In step number 4 we have 2 options: **Auto Align** a sample or assisted **Manual Align** a sample.

4.1 **Auto Align**

4.2 Click the **Auto Align** button

4.2.1 Click **Run** to start the alignment



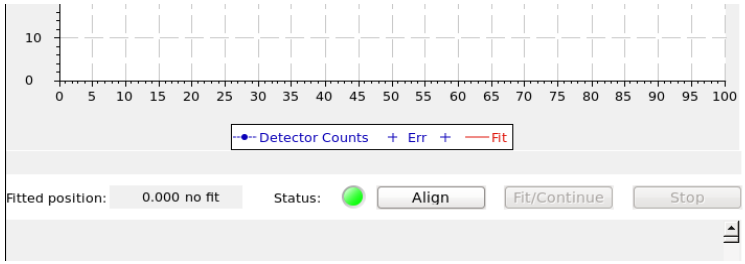
4.3 **Manual Align**: This is assisted manual alignment if needed.

4.3.1 Click the **Manual Align** button

4.3.2 Step though each step in the **Guided Alignment Steps** if this needed

4.3.3 One can also manually enter in values into the blue boxes on the screen, ensuring to press the **ENTER** button on the keyboard to input the values.

4.3.4 To start the scans, click the **Align** button located below the graph.



5. Collect Data

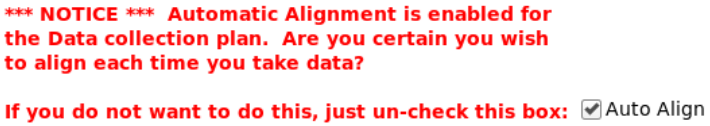
This tab is used to collect Reflectivity. The view will change based on the sample environment that is selected in tab 1, step 1.2.

5.1 Multi-Environment Chamber

5.1.1 When this tab is opened, you may have to change the **Data collection plan:** to 2 layers from the **"layers of loops"** dropdown menu.

5.1.1.1 This will change the display so that the correct sample environment can be selected to run along with the neutrons.

5.1.2 If this box is checked, then there will be an auto-alignment run between each temperature change. If this is not desired, then uncheck the box.



5.1.3 Select **SampleTemp** from the dropdown so that the reflectivity and run per temperature needed.

5.1.3.1 You can either set a **start**, **stop**, and **step number** for the temperature or list the temperatures need in the **free input** box. Press ENTER after each entry.

5.1.3.1.1 Values are listed in the **free input** box override start/stop inputs.

5.1.4 **Soak for** is the equilibrium time needed at each temperature before neutron reflectivity starts.

5.1.4.1 Enter the time in seconds and press ENTER.

5.1.5 **Collecting data using scan file** is where one would select the set of reflectivity setting to run.

5.1.5.1 Click the folder on the collected direct beam runs using .csv file line to select the direct beam sequence you want to run.

5.1.5.1.1 They are located in the /home/controls/var/tmp/ folder either in the 30Hz_Scans, 60Hz_Scans or Liquid Scans folders and have refl at the front of the file.

5.1.6 **Sample Name** is where the name of the sample is entered. Press ENTER to ensure the name is changed after it is inputted.

5.1.7 **Send email notifications to:** Enter email address you'd like notifications to be sent to and press ENTER after you input the information.

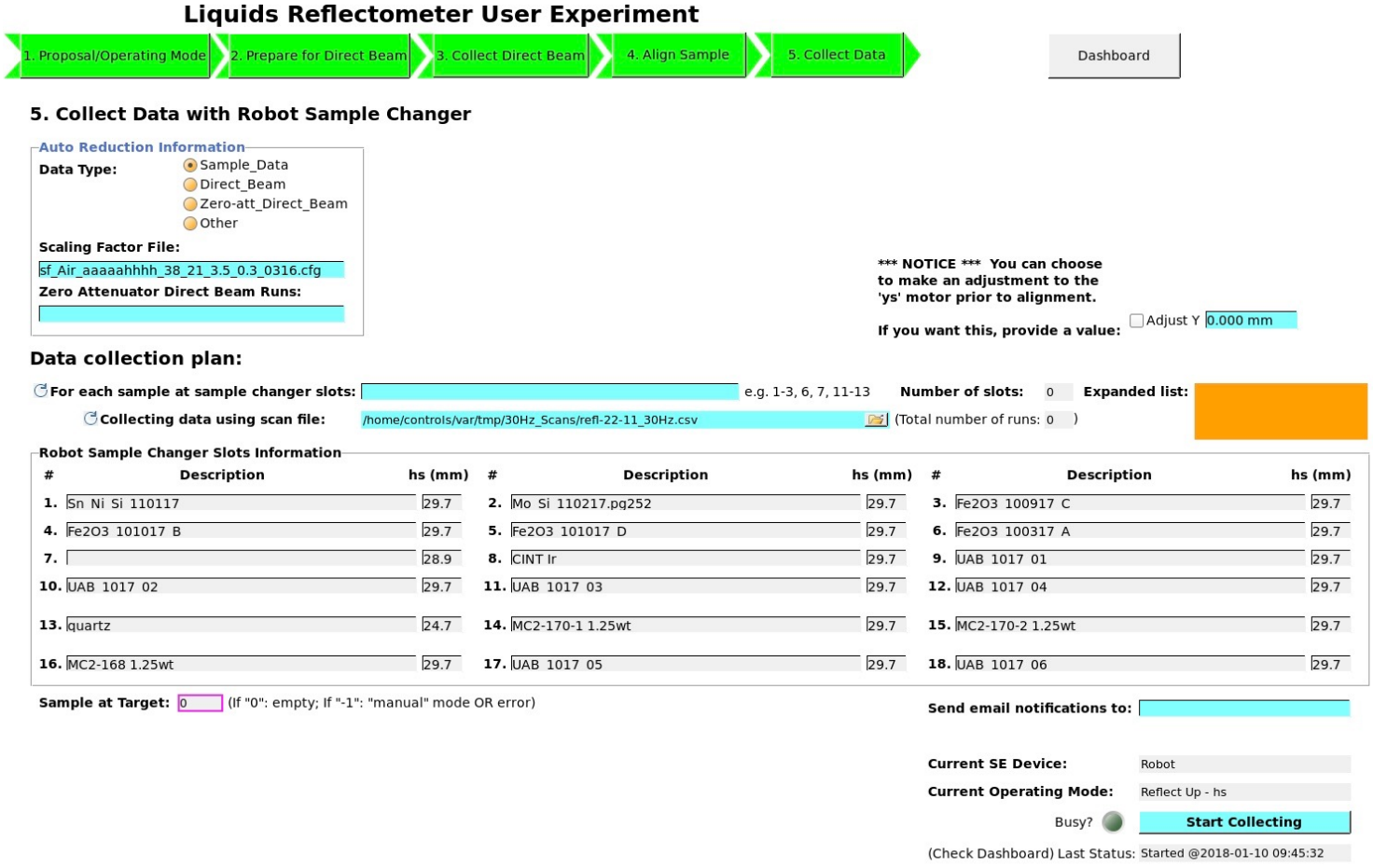
5.1.8 Click **Start Collecting** to collect the reflectivity

5.2 Robot

5.2.1 Follow the **Robot Magazine Operation** guide for loading the sample magazine before performing this

step.

5.2.2 This view is accessed by clicking the **5. Collect Data** tab and is present when robot is selected in step 1.2.



5.2.3 **Data collection plan:**

5.2.3.1 Enter the range and/or sequence of samples you'd like run in the **For each sample at sample changer slots** box, press ENTER.

5.2.3.2 **Collecting data using scan file** is where one would select the set of reflectivity setting to run.

5.2.3.2.1 Click the folder on the collected direct beam runs using .csv file line to select the direct beam sequence you want to run.

5.2.3.2.2 They are located in the /home/controls/var/tmp/ folder either in the 30Hz_Scans, 60Hz_Scans or Liquid Scans folders and have refl at the front of the file.

5.2.3.3 **Robot Sample Changer Slots Information**

5.2.3.3.1 The slot will turn blue when there is a sample in that slot.

5.2.3.3.2 Enter the name of the sample in the **Description** from the sample magazine log sheet in accordance with the slot number. Press ENTER to ensure the name is changed after it is inputted.

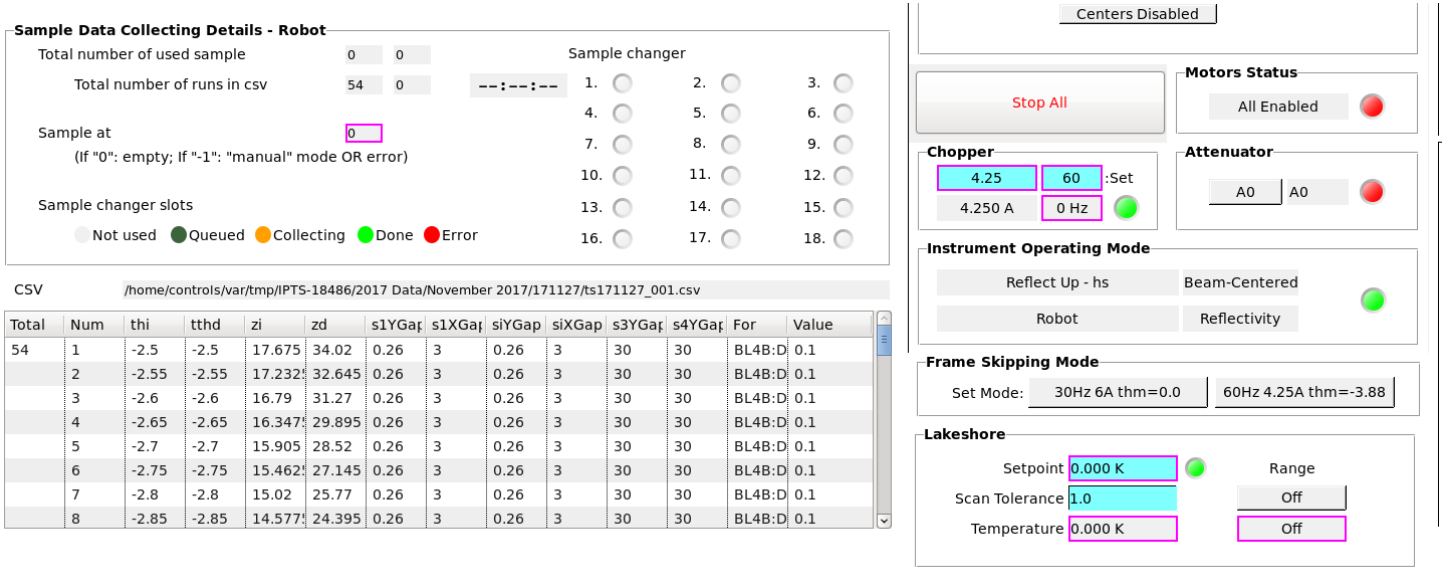
5.2.3.3.3 Type the hs value into the **hs (mm).** This is when you have different thickness of substrates. The standard substrate size is 2" diameter with a 5 mm thickness.

5.2.3.3.3.1 We can run, 2", 3", and 4" diameter samples.

5.2.3.4 **Send email notifications to:** Enter email address you'd like notifications to be sent to and press ENTER after you input the information.

5.2.4 Click **Start Collecting** to collect the reflectivity for each sample

5.2.5 Dashboard view with Robot Status:



5.2.5.1 A color change will appear by the sample number ran.

5.2.5.2 If the auto alignment fails on a sample, a red dot will appear next to the number and the robot will put

the sample back into the sample magazine and move on to the next sample in the sequence.

5.3 Special SE Devices
5.4 Liquids/Solid Cell
5.5 Electrochemical Cell
5.6 Langmuir Trough
5.7 Flow/Shear Cell

6. Dashboard

After launching your data collection, return to **Dashboard** and watch it roll in.