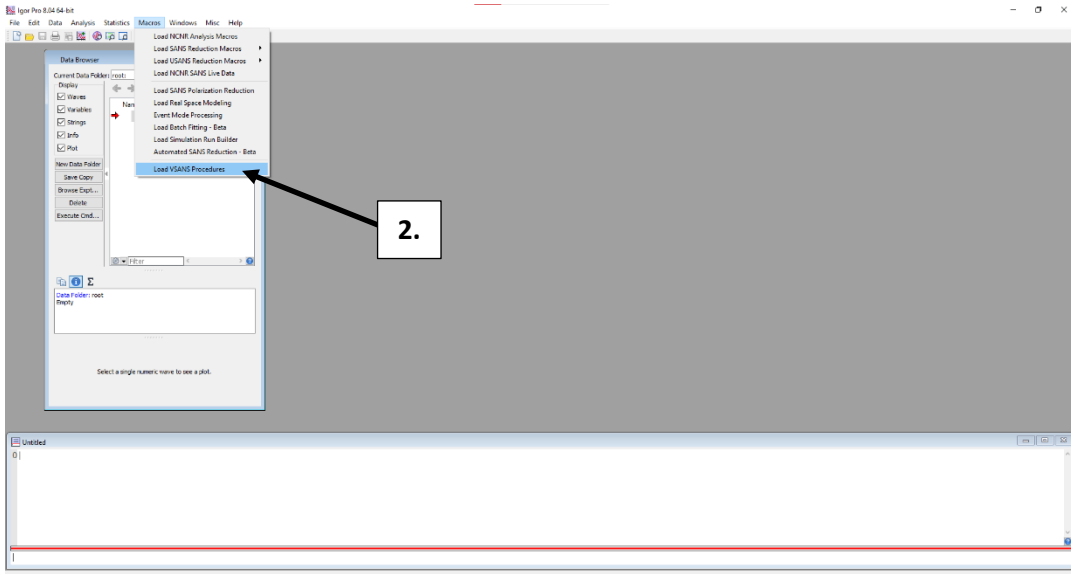vSANS Data Reduction Protocol

Make sure to save (cntrl+S) your file periodically throughout the reduction process. The software may crash if handling a large number of files. Saving prevents loss of progress.

1. Open Igor Pro (latest version at https://www.wavemetrics.com/software/igor-pro-8)

2. In the Macros menu, select **Load VSANS Procedures** (latest version at https://www.nist.gov/ncnr/data-reduction-analysis/sans-software → '**Latest GitHub Release**')


3. Choose to **Yes** or **No** to using back detector (usually **No**)

4. In the green VSANS Reduction Controls panel, select **Pick Path** and choose the folder where your raw VSANS files are located.
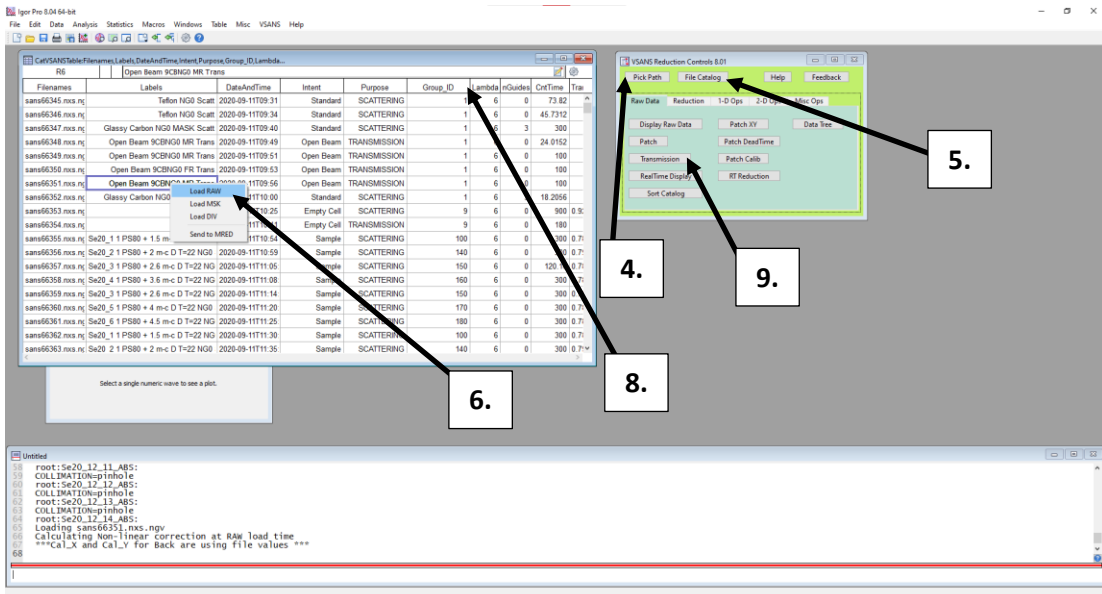

5. Select '**File Catalog**' from the Reduction Controls panel.

6. In the white File Catalog, left click on the middle right open beam transmission file (e.g. Open Beam NG0 MR Trans). Select **Load RAW** from menu that appears.

7. Navigate to the **Middle** tab of the tan WORK_RAW panel that appears. Draw a box around the beam (high intensity spot on the detector) by clicking and dragging so that the whole beam is included. Left click inside the selection box and select **V_UpdateBoxCoords**. Kill WORK_RAW panel by shift-clicking the x in the top right corner of the panel.
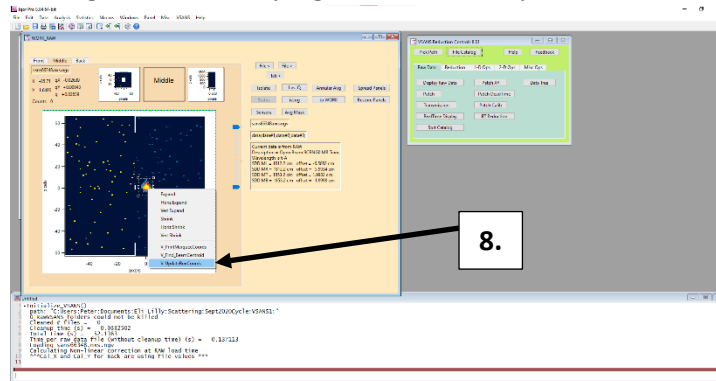

8. In the File Catalog, check that the Group_IDs match for the transmission and scattering files of each sample. If they do not match, these can be patched by selecting the Group_ID cell to be patched, correcting the Group_ID number and navigating to **VSANS → Nexus File Corrections → Patch GroupID using CatTable**. Other file corrections can be made using other options in the **VSANS** menu.

9. In the Reduction Controls panel (green), select **Transmission**. In the brown **V_TransmissionPanel**, left click on the **Open Beam** pop-up menu. Select the Open Beam file for which the box coordinates were updated in Step 7 (**XY Box** numbers should change to box coordinates instead of the default 1;2;3;4;).
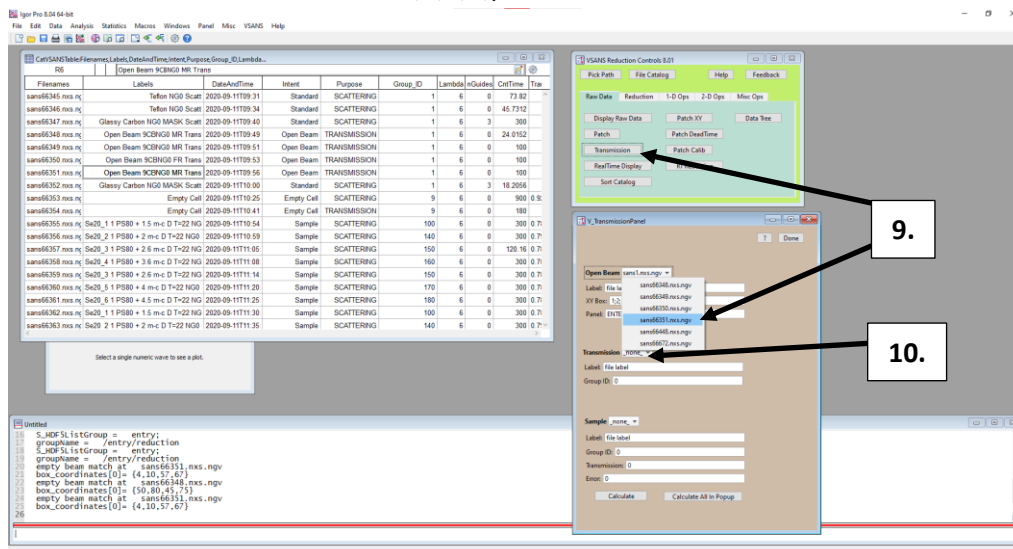

10. In **V_TransmissionPanel**, left click **Transmission** pop-up menu. Select transmission file of data being reduced. Select either **Calculate** to calculate the transmission for a single file currently in

the **Sample** pop-up menu or **Calculate All In Popup** to calculate a single transmission for all of the files in the **Sample** pop-up menu. When finished, select **Done**.

*Only samples having Group_IDs matching the Group_ID of the file currently selected in the **Transmission** pop-up menu are listed in the **Sample** pop-up menu.
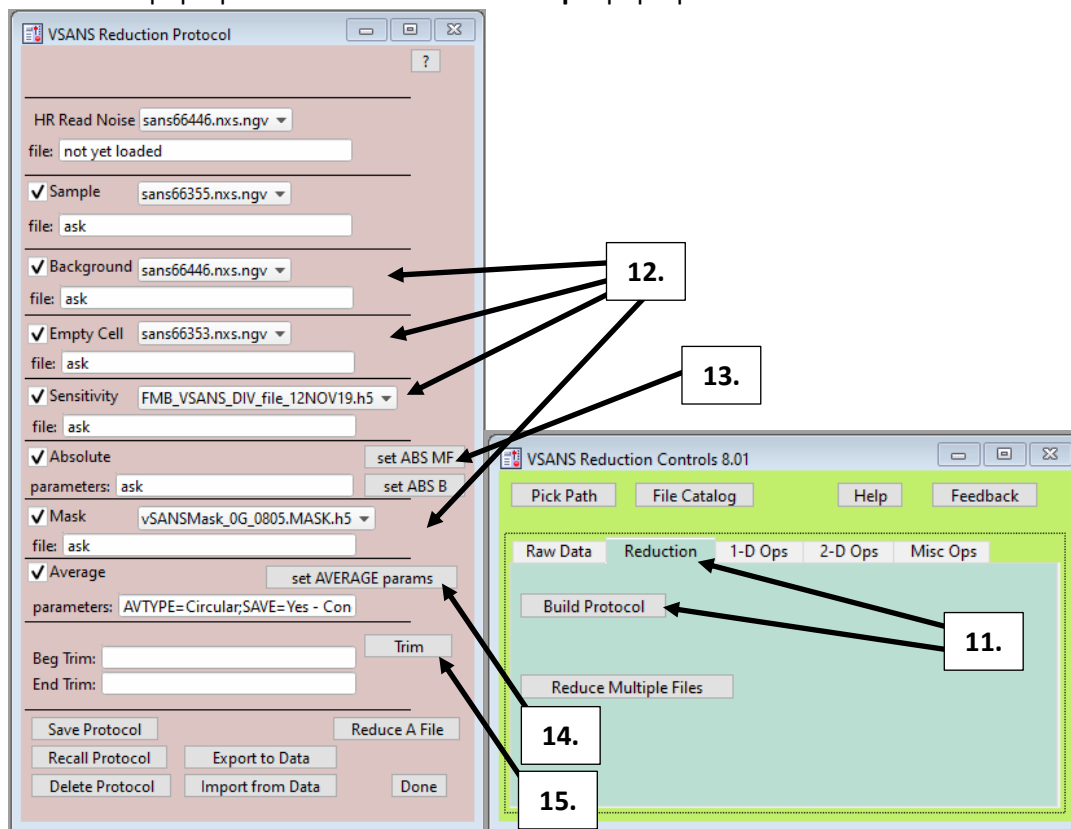

11. Navigate to **Reduction** tab in Reduction Controls panel (green). Select **Build Protocol**.

12. In the lilac (light greyish red) **VSANS Reduction Protocol** menu, select the **Background** file (Blocked Beam) from the pop-up menu. Select **Empty Cell** file from pop-up menu. Repeat for **Sensitivity** and **Mask** files. Directions for making mask files can be found in the VSANS help files.

13. In the **Absolute** section of the VSANS Reduction Protocol panel, select **set ABS MF**. Select **Empty Beam Flux** from the Absolute Scaling panel that appears. Select the Open Beam file that was used for calculating transmission in Step 9. Press Continue. Select DIV File. Press Continue.

14. In the **Average** section of the VSANS Reduction Protocol panel, select **set AVERAGE params**. Choose **Type of Average** (typically Circular). Choose **Binning Type*** (typically F1-M2xTB-B). *Every detector after 'x' in a binning type is removed from the data averaging.
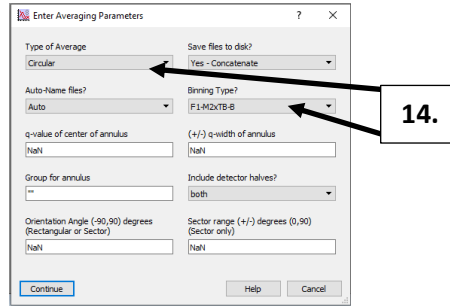
15. In Data Catalog, click on sample scattering data and choose **Load RAW** from menu. Close WORK_RAW by shift-clicking x in the top right corner. Select **Trim** in the VSANS Reduction Protocol panel. In the data plot that appears, select appropriate Bin Type from pop-up menu in top left corner. Remove points as desired* by using the **V_TrimPointsTable**. When finished, select Done on plot window and shift-click x in top right corner of **V_TrimPointsTable**.
*Typically, 7-10 points are removed at low q (Beg_pts) for MLR (Middle Left-Right Average) for the beamstop.
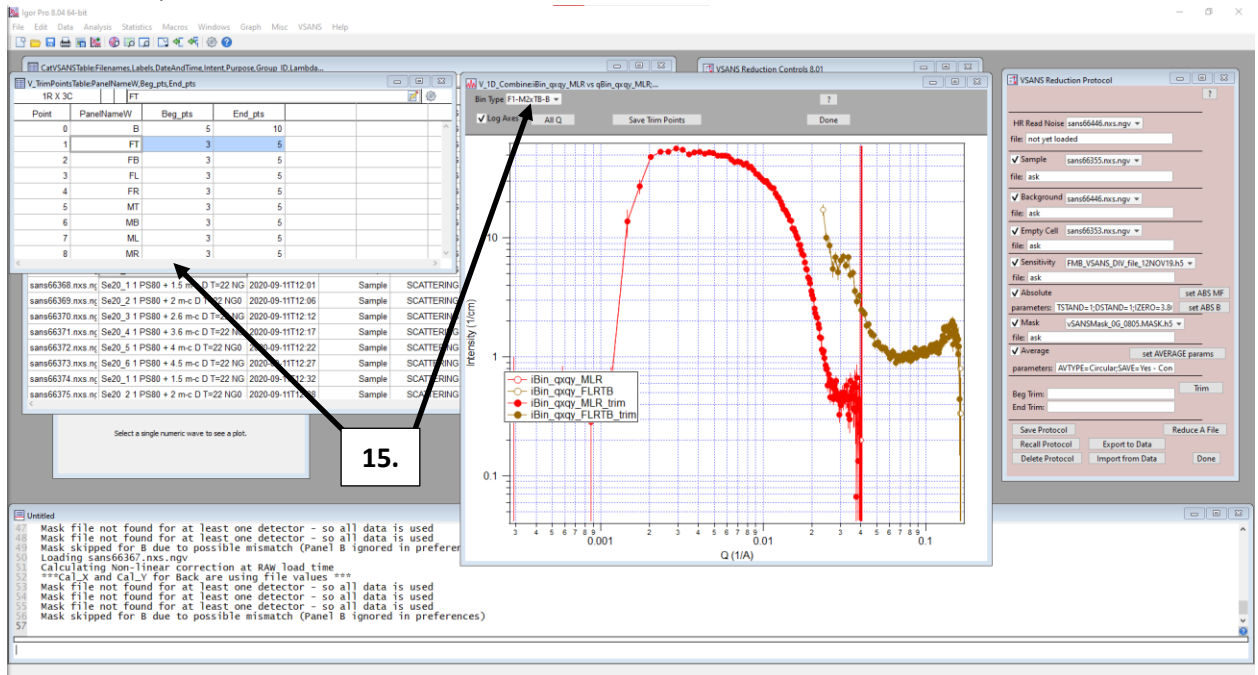

16. In **VSANS Reduction Protocol** panel, select **Save Protocol**. Save with appropriate name identifying the VSANS configuration (e.g. NG0) for which the protocol applies. A new protocol must be built for each VSANS configuration used. Protocols can be edited by choosing **Recall Protocol** and saving it as the same name after completing edits. Select Done when finished.

17. Select **Reduce Multiple Files** from the VSANS Reduction Controls Panel. In the salmon-colored **Muliple VSANS File Reduction** panel, select the appropriate VSANS protocol for the data being reduced (ensure that the protocol corresponds to the same VSANS configuration used to generate the sample data).
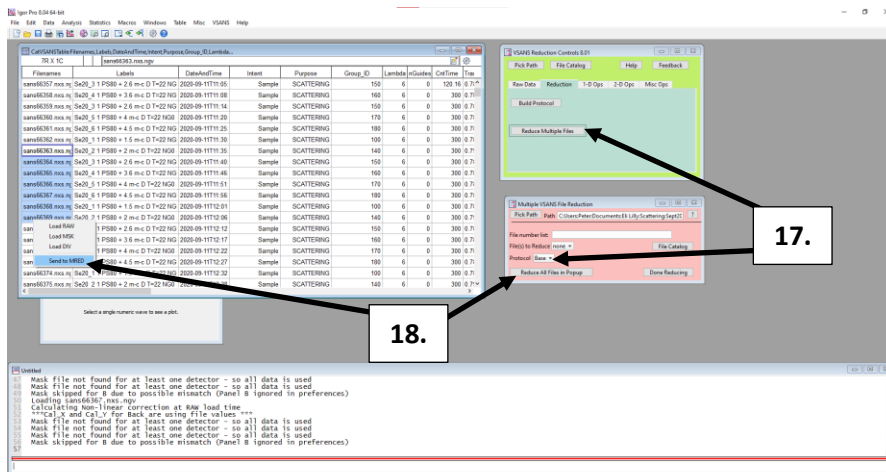
18. In the File Catalog, select the data files to reduce by clicking and dragging. Select **Send to MRED** from the menu that appears when releasing the dragged click. The file names will appear in the **Muliple VSANS File Reduction** panel. Click **Reduce All Files in Popup** to reduce the selected data files. Choose a maximum of approx. 20 files at a time to reduce. Reducing too many files at once can cause the program to crash. When finished reducing files, click Done Reducing. All reduced files should have been output as .ABS files, which can be plotted in Igor or imported into SasView (https://www.sasview.org/download/) for data analysis.

19. To plot reduced VSANS files in Igor, navigate to the **1-D Ops** tab in the VSANS Reduction Controls panel. Select **Plot**. In the bright green **Plot Manager** panel, scroll to the **.ABS** file to be plotted. Multiple files can be selected by holding shift while scrolling and clicking. When files are selected, click **Load File(s)**. If the box 'Plot data on loading' beneath **Load File(s)** is checked, dialog boxes will appear to help the plotting process (e.g. appending data to the same plot).
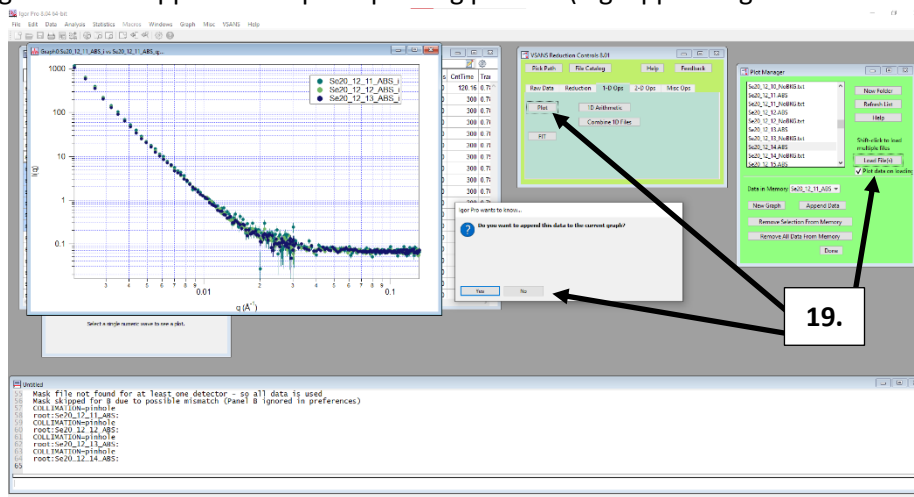
20. Make sure to **save** your project by pressing cntrl+s.