

Introduction to GIXSGUI

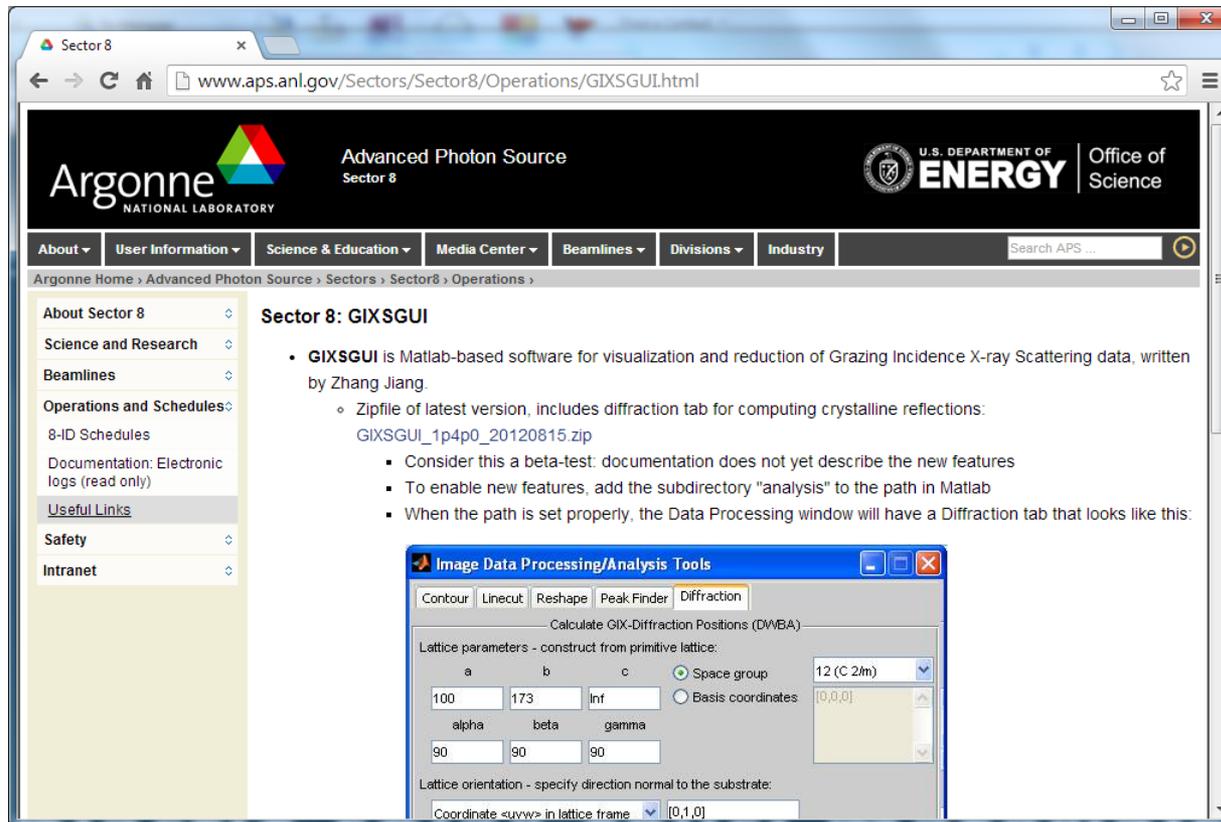
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GIXSGUI by Zhang Jiang

Downloading GIXSGUI

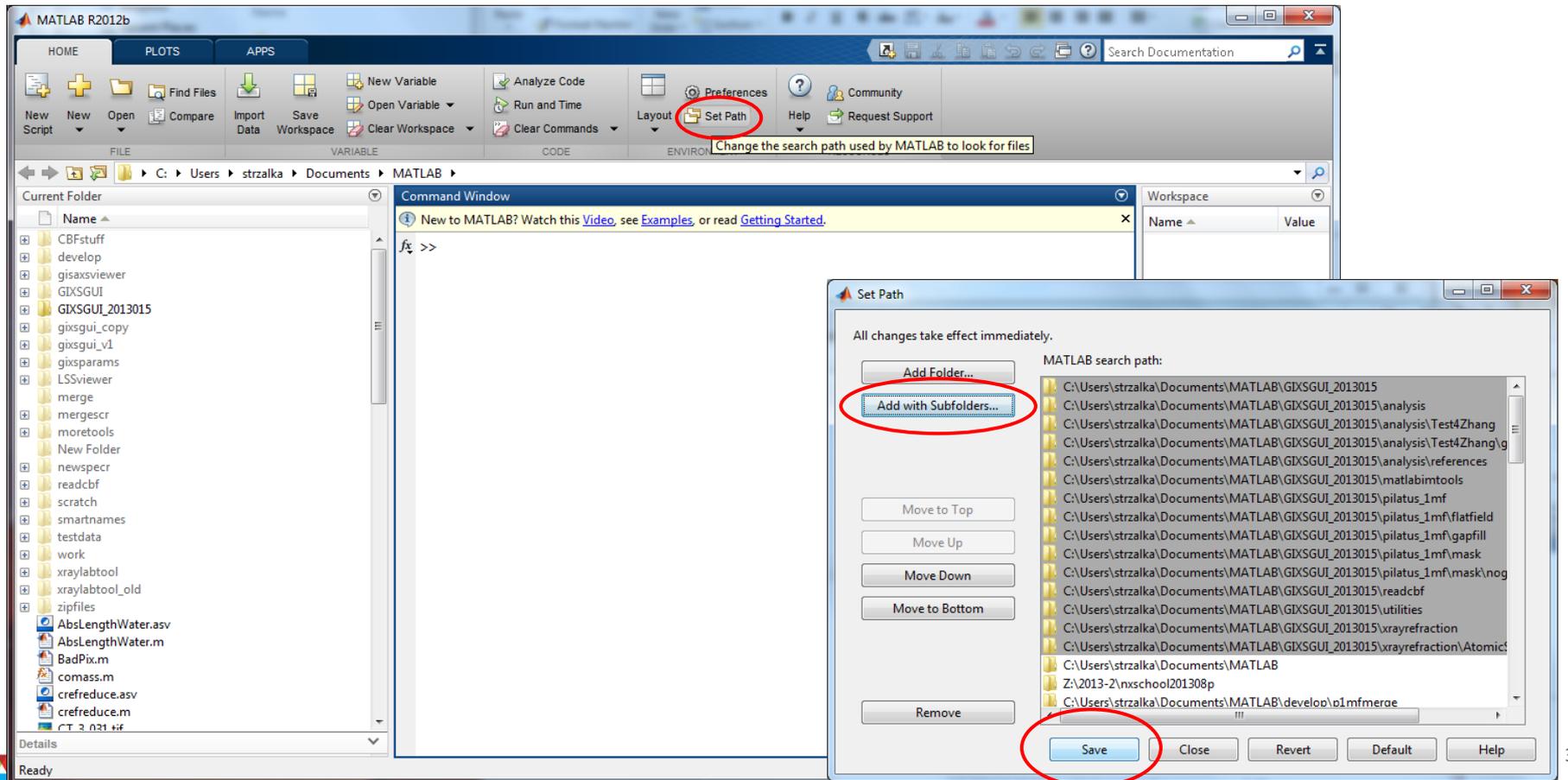
- GIXSGUI is a Matlab package available for download:
www.aps.anl.gov/Sectors/Sector8/Operations/GIXSGUI.html
- Use requires license for Matlab (Distribution 2010a or newer).



The screenshot shows a web browser window displaying the GIXSGUI page on the Argonne National Laboratory website. The page title is "Sector 8: GIXSGUI". The content includes a description of GIXSGUI as Matlab-based software for visualization and reduction of Grazing Incidence X-ray Scattering data, written by Zhang Jiang. It lists a zipfile of the latest version, "GIXSGUI_1p4p0_20120815.zip", and provides instructions for using the software, including a beta-test and the requirement to add a subdirectory "analysis" to the Matlab path. An inset window titled "Image Data Processing/Analysis Tools" is shown, displaying the "Diffraction" tab. This window contains fields for lattice parameters (a, b, c, alpha, beta, gamma), space group (12 (C 2/m)), and lattice orientation (Coordinate <uvw> in lattice frame [0,1,0]).

Setting up GIXSGUI

- Unzip the .zip file. The doc subfolder contains doc.pdf, documentation for GIXSGUI.
- Start Matlab.
- Modify your path: Set Path → Add with Subfolders → <Select the path for GIXSGUI> → Save



Starting GIXSGUI

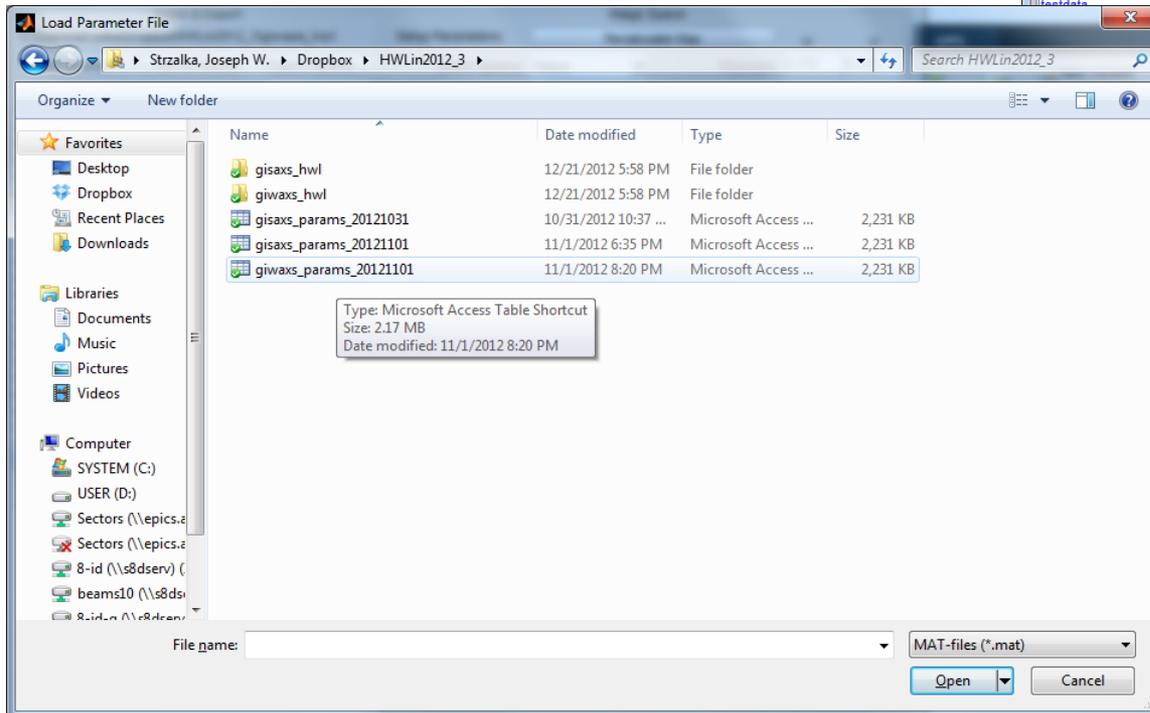
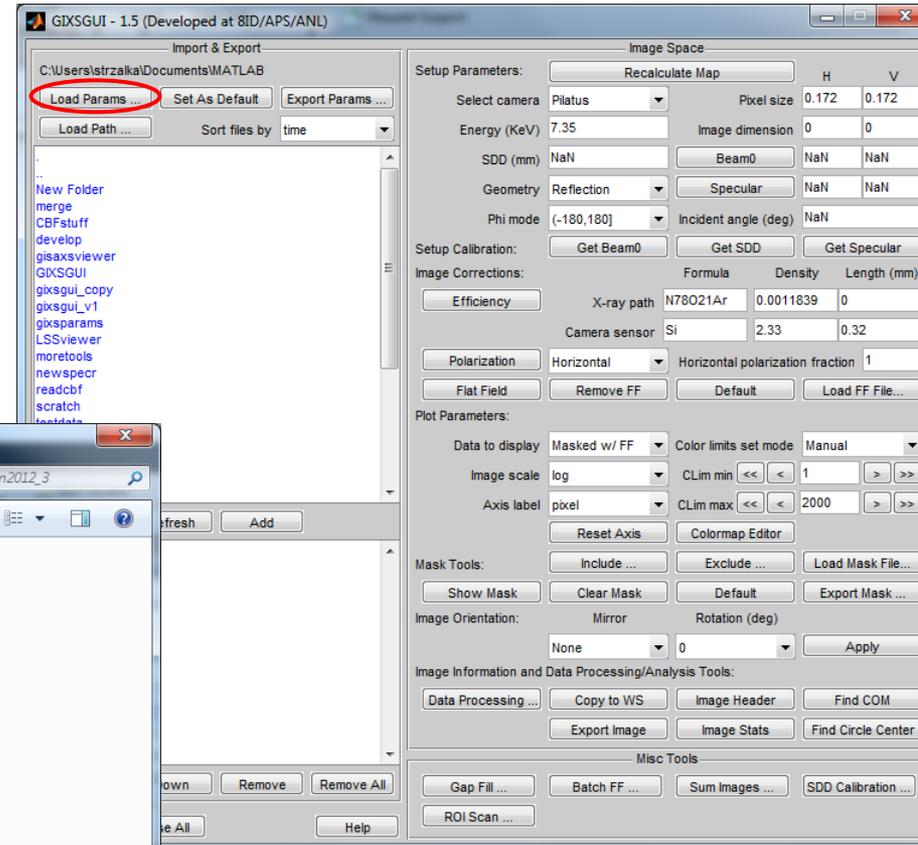
- Enter `gixsgui` into the command window.

The screenshot displays the MATLAB R2012b environment. The Command Window shows the command `>> gixsgui` being executed. The GIXSGUI - 1.5 dialog box is open, showing the file selection process. The dialog box has several sections:

- Import & Export:** Includes buttons for 'Load Params...', 'Set As Default', 'Export Params...', and 'Load Path...'. The current directory is `C:\Users\strzalka\Documents\MATLAB`.
- Image Space:** Contains 'Setup Parameters' (Recalculate Map, Select camera: Pilatus, Energy: 7.35 KeV, SDD: NaN, Geometry: Reflection, Phi mode: (-180,180]), Setup Calibration (Get Beam0, Get SDD, Get Specular), Image Corrections (Efficiency, X-ray path: N78021Ar, Density: 0.0011839, Length: 0), Polarization (Horizontal, Horizontal polarization fraction: 1), Flat Field (Remove FF, Default, Load FF File...).
- Plot Parameters:** Includes Data to display (Masked w/ FF), Image scale (log), and Axis label (pixel).
- Mask Tools:** Includes buttons for Include..., Exclude..., Load Mask File..., Show Mask, Clear Mask, Default, and Export Mask....
- Image Orientation:** Includes Mirror and Rotation (deg) settings.
- Image Information and Data Processing/Analysis Tools:** Includes Data Processing..., Copy to WS, Image Header, Find COM, Export Image, Image Stats, and Find Circle Center.
- Misc Tools:** Includes Gap Fill..., Batch FF..., Sum Images..., SDD Calibration..., and ROI Scan....

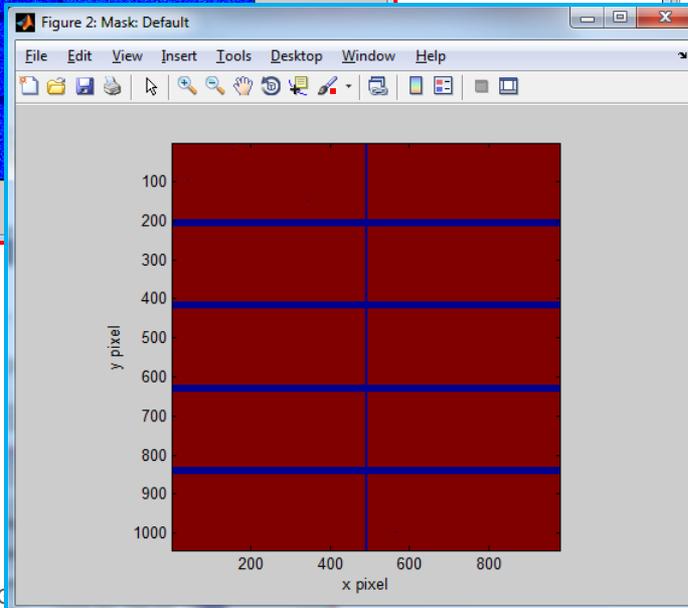
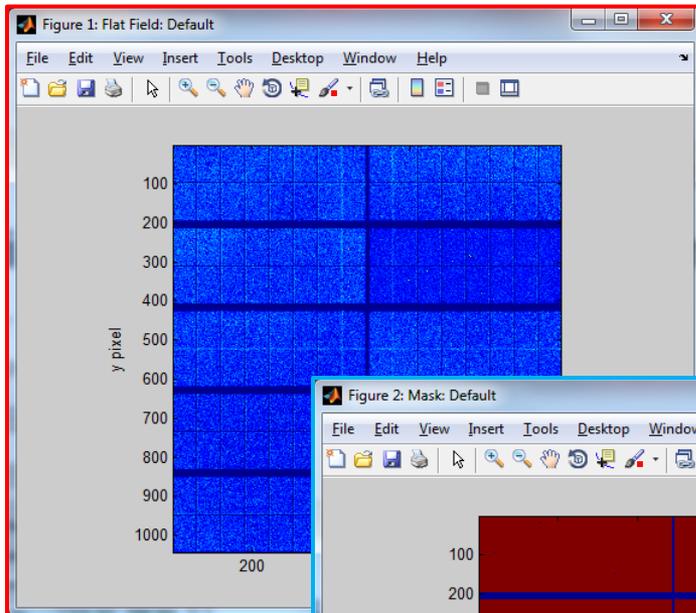
Loading GIXSGUI parameters from a file

- For an existing parameter file:
 - Load the path for your 2-D data files.
 - Load the parameter file.



Loading GIXSGUI parameters from a file

- After loading,
 - Parameters appear
 - Flat field data and mask data are read in



Import & Export

C:\Users\strzalka\Dropbox\HwLin2012_3\giwaxs_hwl

Load Params ... Set As Default Export Params ...

Load Path ... Sort files by time

hwl_bladeglasswaxs_006.tif
hwl_bladeglasswaxs_007.tif
hwl_bladeglasswaxs_008.tif
hwl_bladeglasswaxs_009.tif
hwl_bladeglasswaxs_010.tif
hwl_bladeglasswaxs_011.tif
hwl_bladeglasswaxs_012.tif
hwl_bladeglasswaxs_013.tif
hwl_bladeglasswaxs_014.tif
hwl_bladeglasswaxs_023.tif
hwl_bladeglasswaxs_024.tif
hwl_bladeglasswaxs_025.tif
hwl_bladeglasswaxs_026.tif
hwl_bladeglasswaxs_027.tif
hwl_bladeglasswaxs_028.tif
hwl_bladeglasswaxs_029.tif
hwl_bladeglasswaxs_030.tif
hwl_bladeglasswaxs_031.tif
hwl_bladeglasswaxs_032.tif
hwl_bladeglasswaxs_033.tif
hwl_bladeglasswaxs_034.tif

Refresh Add

Up Down Remove Remove All

Quit Close All Help

Image Space

Recalculate Map

Setup Parameters:

Select camera Pilatus Pixel size 0.172 0.172

Energy (KeV) 7.35 Image dimension 0 0

SDD (mm) 204 Beam0 826.562 996.999

Geometry Reflection Specular 826.562 896.999

Phi mode (-180,180] Incident angle (deg) 0.2

Setup Calibration: Get Beam0 Get SDD Get Specular

Image Corrections: Formula Density Length (mm)

Efficiency X-ray path N78O21Ar 0.001839 204

Camera sensor Si 2.33 0.32

Polarization Horizontal Horizontal polarization fraction 1

Flat Field Remove FF Default Load FF File...

Plot Parameters:

Data to display Masked w/ FF Color limits set mode Manual

Image scale log CLim min <<< 1 >>>

Axis label pixel CLim max <<< 2000 >>>

Reset Axis Colormap Editor

Mask Tools: Show Mask Include ... Exclude ... Load Mask File... Clear Mask Default Export Mask ...

Image Orientation: Mirror Rotation (deg) None 0 Apply

Image Information and Data Processing/Analysis Tools:

Data Processing ... Copy to WS Image Header Find COM

Export Image Image Stats Find Circle Center

Misc Tools

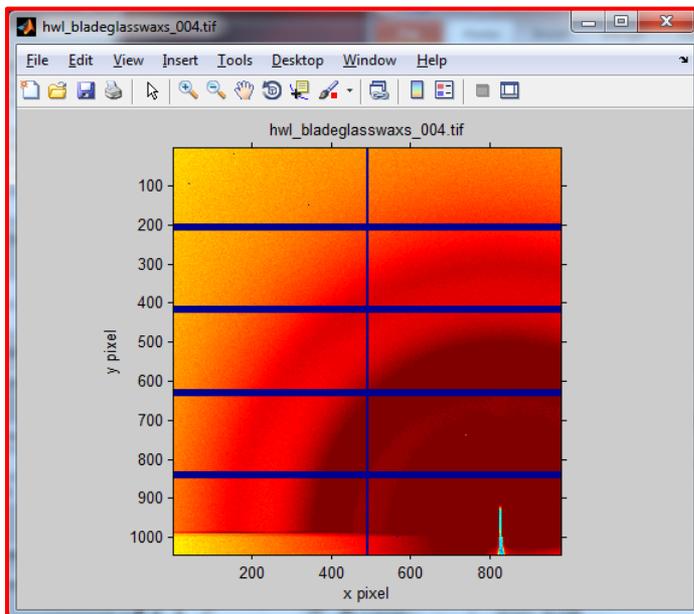
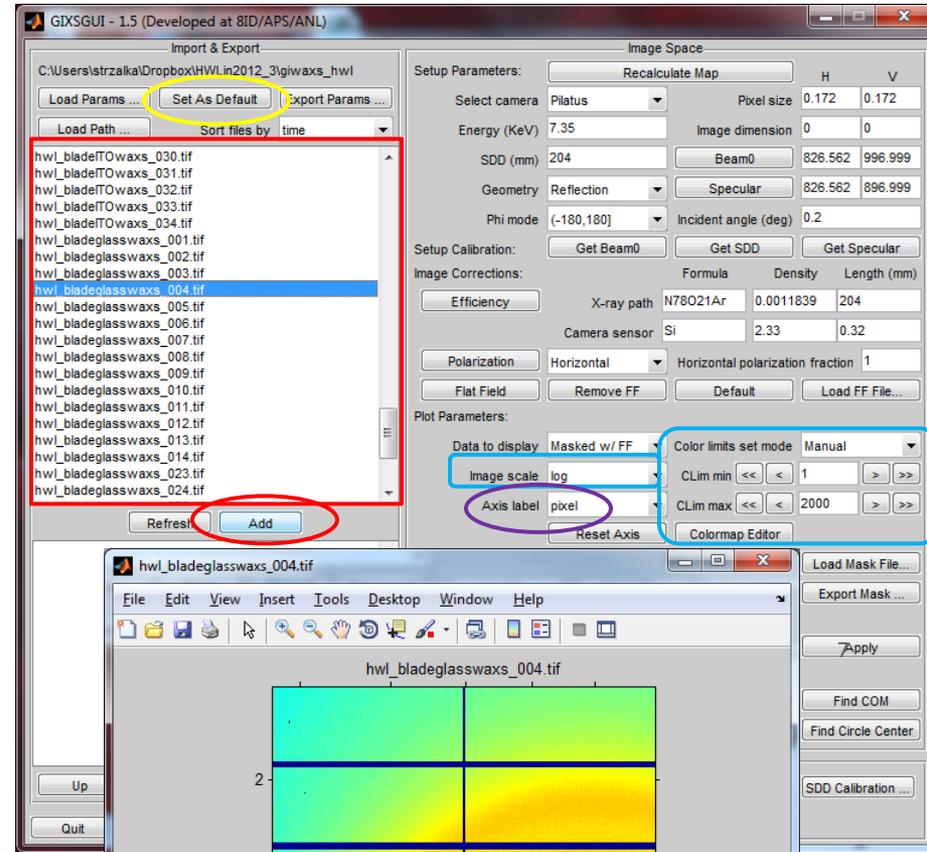
Gap Fill ... Batch FF ... Sum Images ... SDD Calibration ...

ROI Scan ...



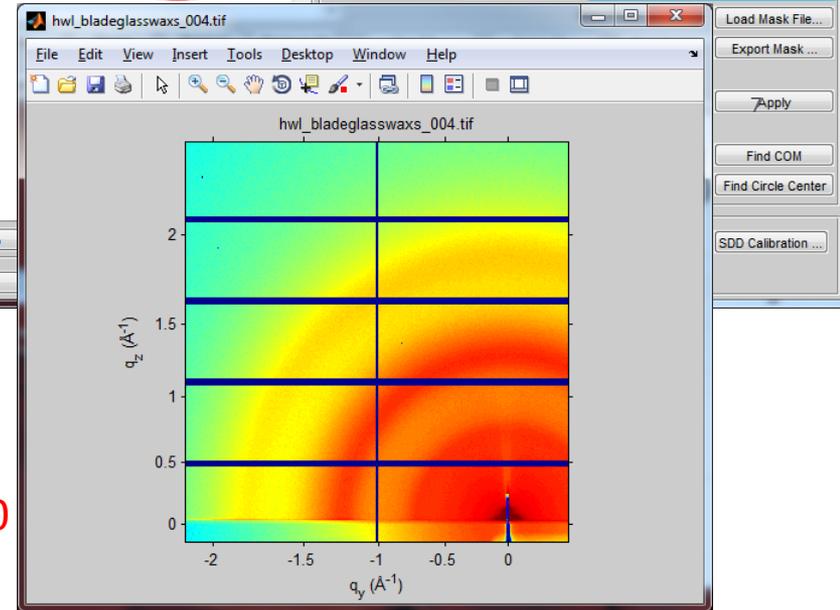
Displaying 2-D data in GIXSGUI

- Select a file in the **path list box**
 - Double click on the filename OR
 - Click the **Add** button
 - Image appears
 - Adjust color scale with **controls**
 - Control axes with **Axis label** menu
 - Make new settings default with **Set as Default** button



→

Clim min = 10
Clim max = 10000
Axis label = q



Applying simple linecuts

- **Data processing** button calls up new window
- For Constrained linecut, set **X variable**, **Constraints**, enter **# of points** in the result and set the **Linecut plot scale**
- Click **Constrained Image** to see the region included in the integration
- Click **Cut** to produce the linecut
- Note: linecut is performed on whichever **image is selected in the list box**.

The image shows two windows from the GXSGUI software. The left window, titled 'GXSGUI - 1.5 (Developed at 8ID/APS/ANL)', displays a file list on the left and various setup parameters on the right. The file 'hwl_bladeglasswaxs_004.tif' is selected in the list box. The 'Data Processing' button is circled in red. The right window, titled 'Image Data Processing/Analysis Tools', shows the 'Linecut' tab. The 'Linecut plot scale' is set to 'logy'. The 'Free linecut' section has 'Interactive Cut' and 'Defined Cut' buttons. The 'Constrained linecut' section has 'X variable' set to 'q' and '# of points' set to '200'. The constraints table is as follows:

| Constraint # | Operator | Value 1 | Operator | Variable | Operator | Value 2 |
|---------------|----------|---------|----------|----------|----------|---------|
| Constraint #1 | AND | 180 | <= | phi | <= | 170 |
| Constraint #2 | AND | NaN | <= | none | <= | NaN |
| Constraint #3 | AND | NaN | <= | none | <= | NaN |
| Constraint #4 | AND | NaN | <= | none | <= | NaN |

The 'Cut' button is circled in purple, and the 'Constrained Image' button is circled in blue. The 'Data Processing' button in the left window is also circled in red.

Example Linecut

- Settings on previous slide produce the Constrained Image (left) and the linecut (right) below.

