



Integration of PyFAI at BL11 NCD-SWEET

7-8 February 2019 ESRF

OUTLINE

- Beamline overview
- Data acquisition and preprocessing
- TaskManagerDS
- PyFAI GUI

BL11 NCD-SWEET

NON CRYSTALLINE DIFFRACTION

- Small Angle X-ray Scattering
- Wide Angle X-ray Scattering
- Grazing-Incidence X-ray Scattering



BL11 NCD-SWEET

NON CRYSTALLINE DIFFRACTION

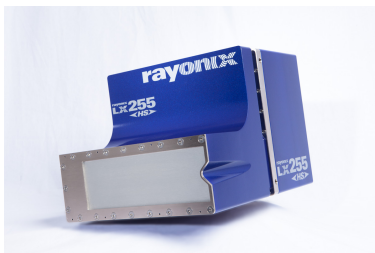
- Small Angle X-ray Scattering
- Wide Angle X-ray Scattering
- Grazing-Incidence X-ray Scattering

PILATUS 1M

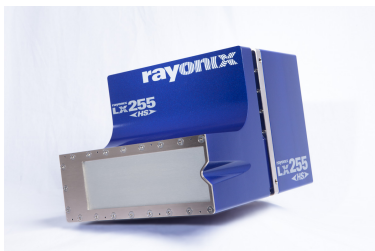


RAYONIX
LX255-HS

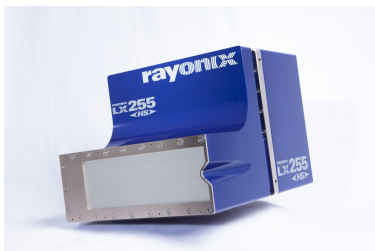
Detector Data Acquisition



Detector Data Acquisition

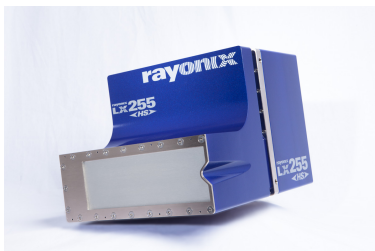


Detector Data Acquisition



- Pilatus 981 x 1043 px
- Rayonix 5760 x 1920 px
- ~1000 images
- Period ~3s
 - ~ 60min / experiment
- Images on NFS

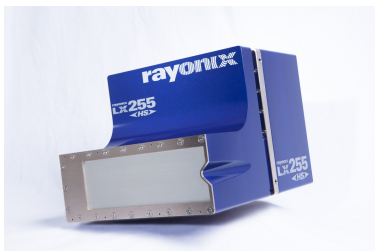
Detector Data Post-processing



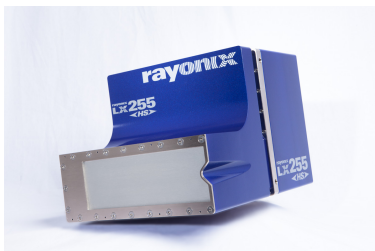
Before

- ~1000 images
- PyFAI Postprocessing
 - ~ 0.3s Saxs
 - ~ 1s WaxS
 - ~ 1s reading
- ~ 1h post processing
- ATLAS visualization

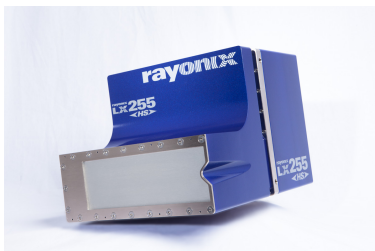
Detector Data Post-processing



Detector Data Post-processing



Detector Data Post-processing



Task
Manager
TANGO



Task
Manager
TANGO

Now

- Automatic Post-processing
- In paralel with experiment
- Experiment monitoring
- Faster reaction
- Interactive GUI

TaskManager DS



TaskManager DS

Task
Manager
TANGO 

attributes

TaskManager DS

Task
Manager
TANGO 

- Poni file
- Mask
- Dark
- Number of points
- Q units
- Azimuthal range
- Radial range

TaskManager DS

Task
Manager
TANGO 

attributes

TaskManager DS

TANGO
event

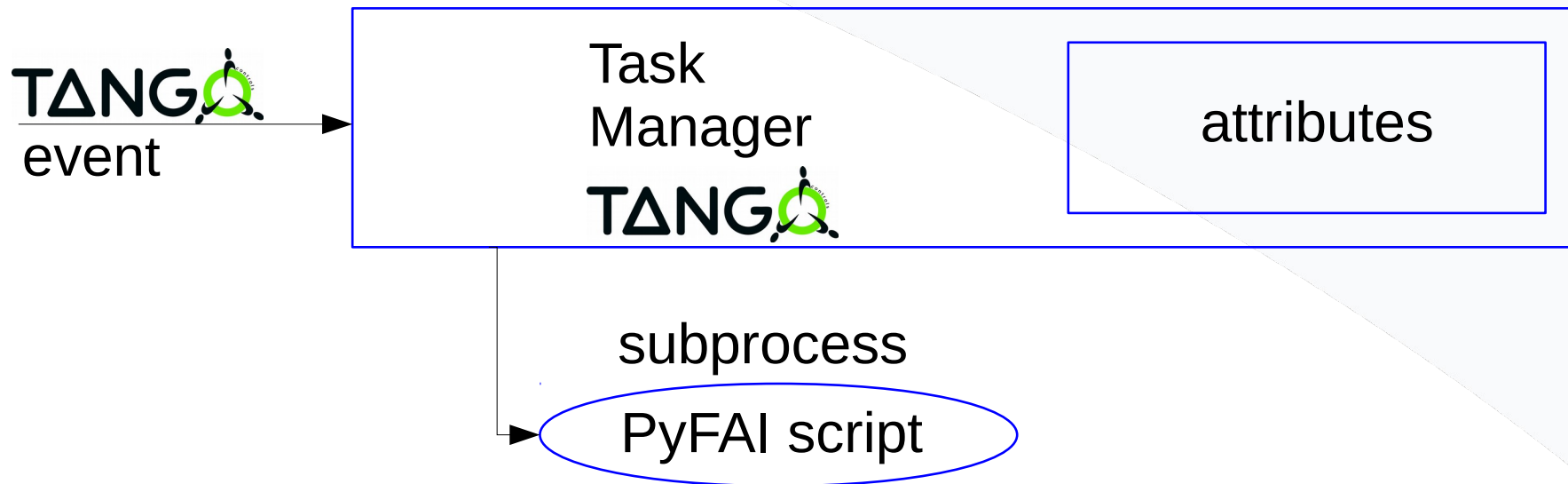


Task
Manager

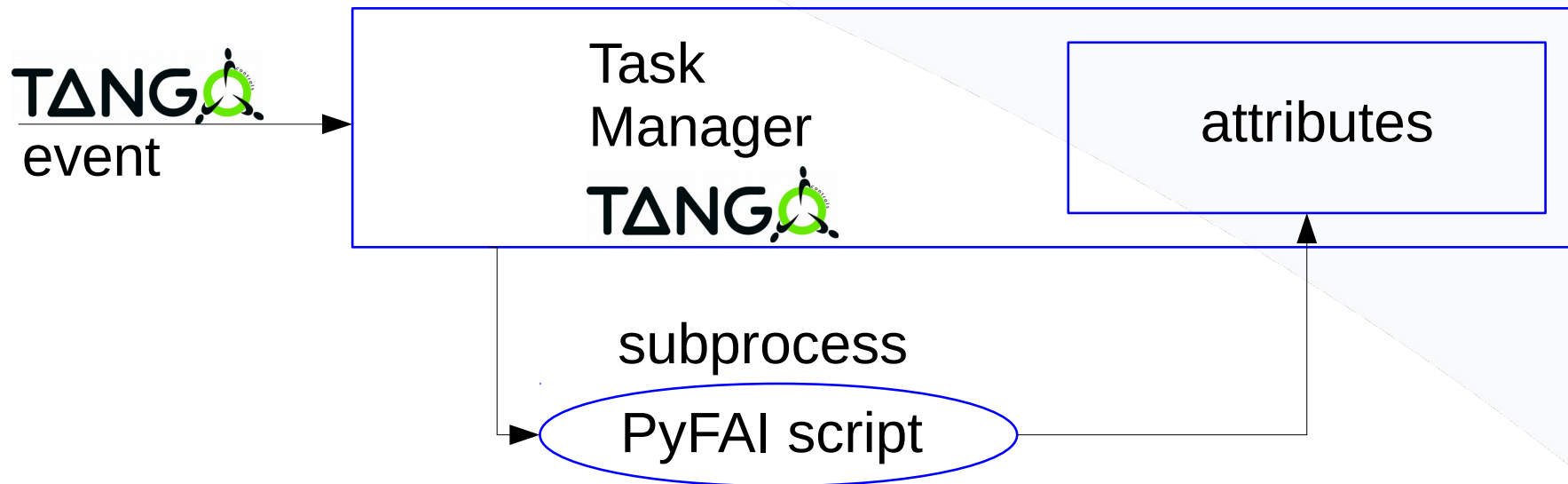
TANGO

attributes

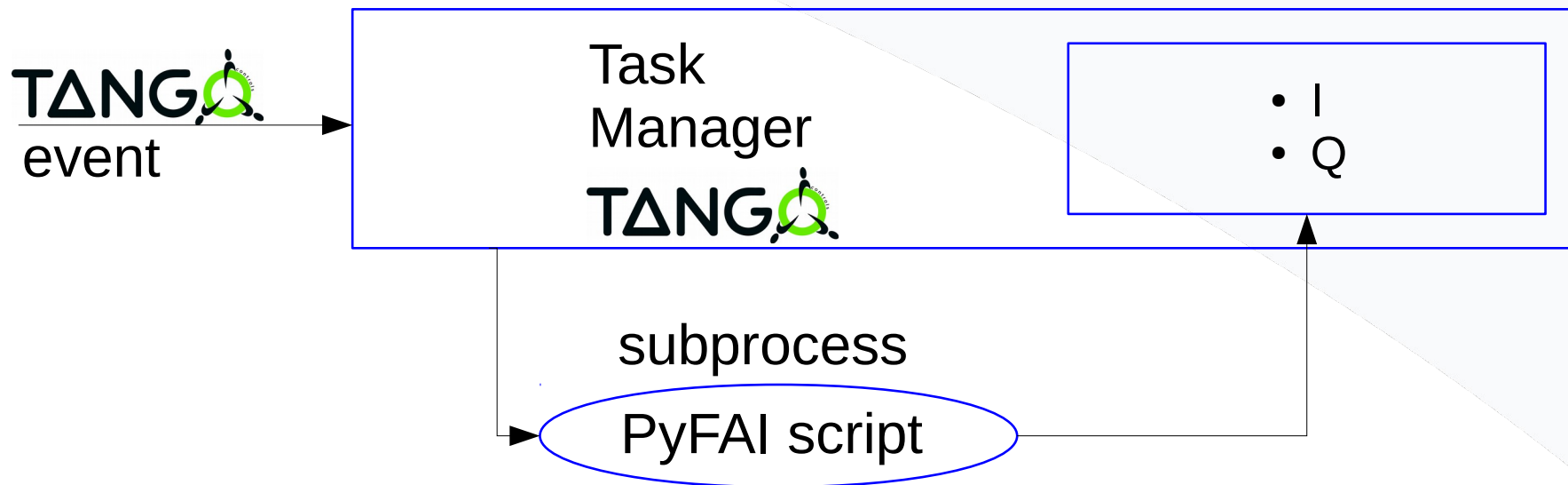
TaskManager DS



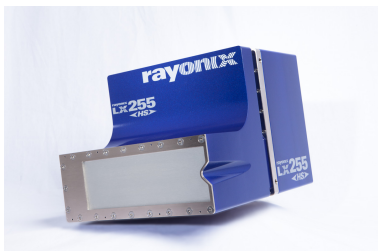
TaskManager DS



TaskManager DS



PyFAI GUI



Task
Manager
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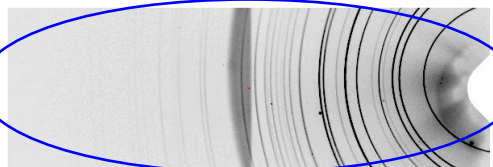


Task
Manager
TANGO 

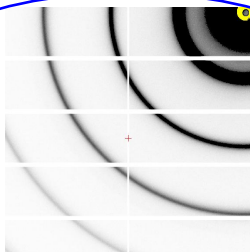


PyFAI GUI

subprocess



subprocess



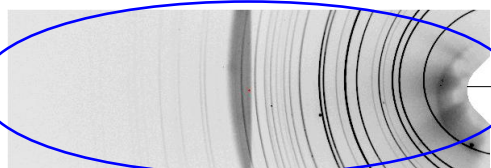
Task
Manager
TANGO 

Task
Manager
TANGO 



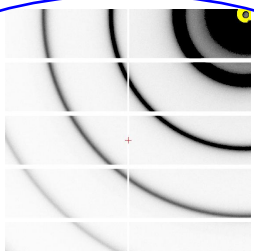
PyFAI GUI

subprocess



Task
Manager
TANGO 

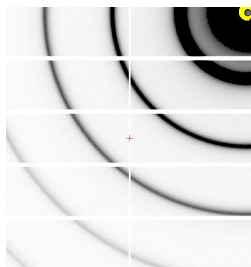
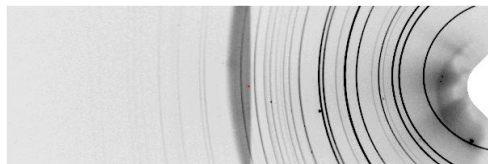
subprocess



Task
Manager
TANGO 



PyFAI GUI

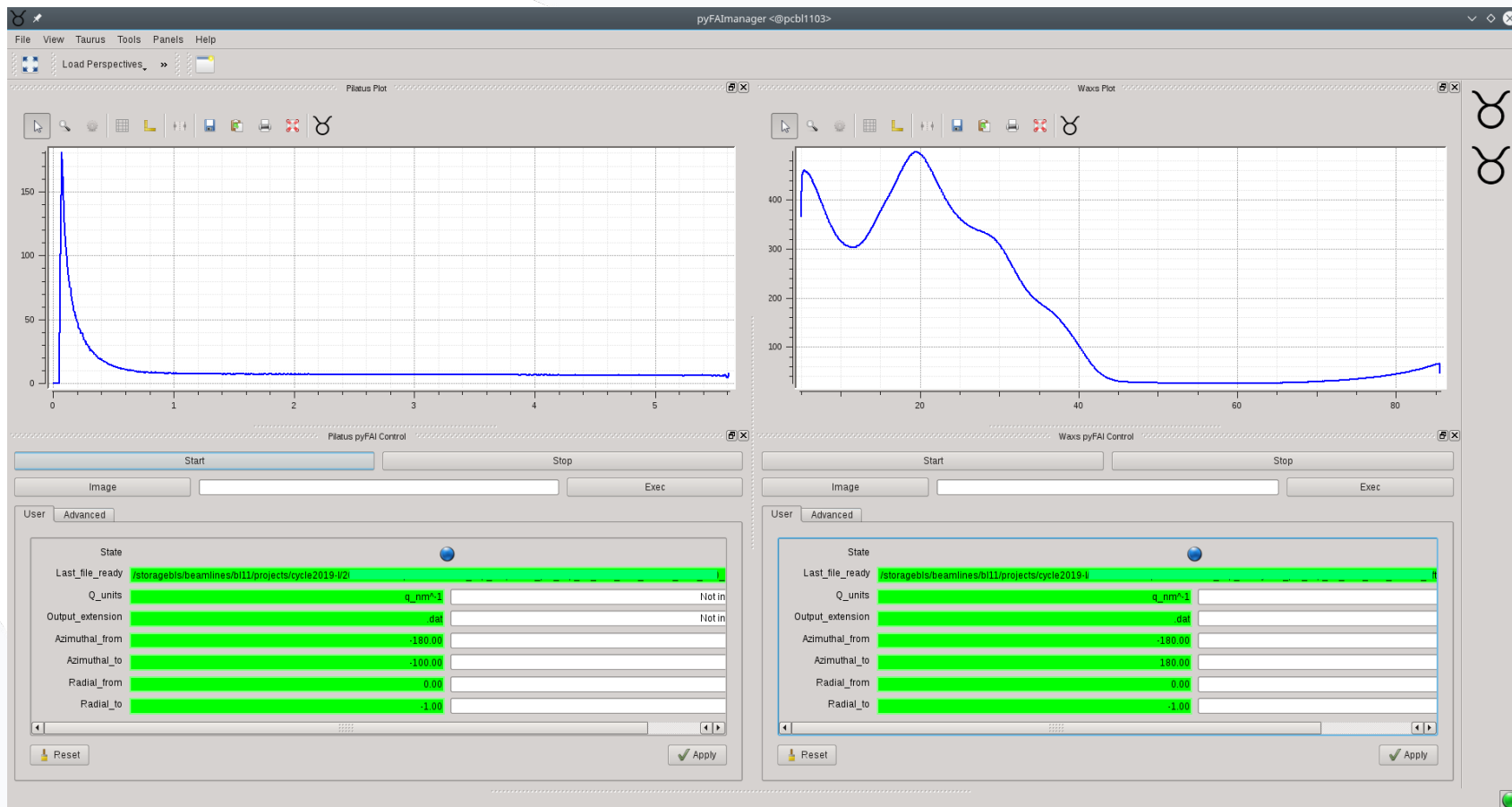


Task
Manager
TANGO

Task
Manager
TANGO



PyFAI GUI



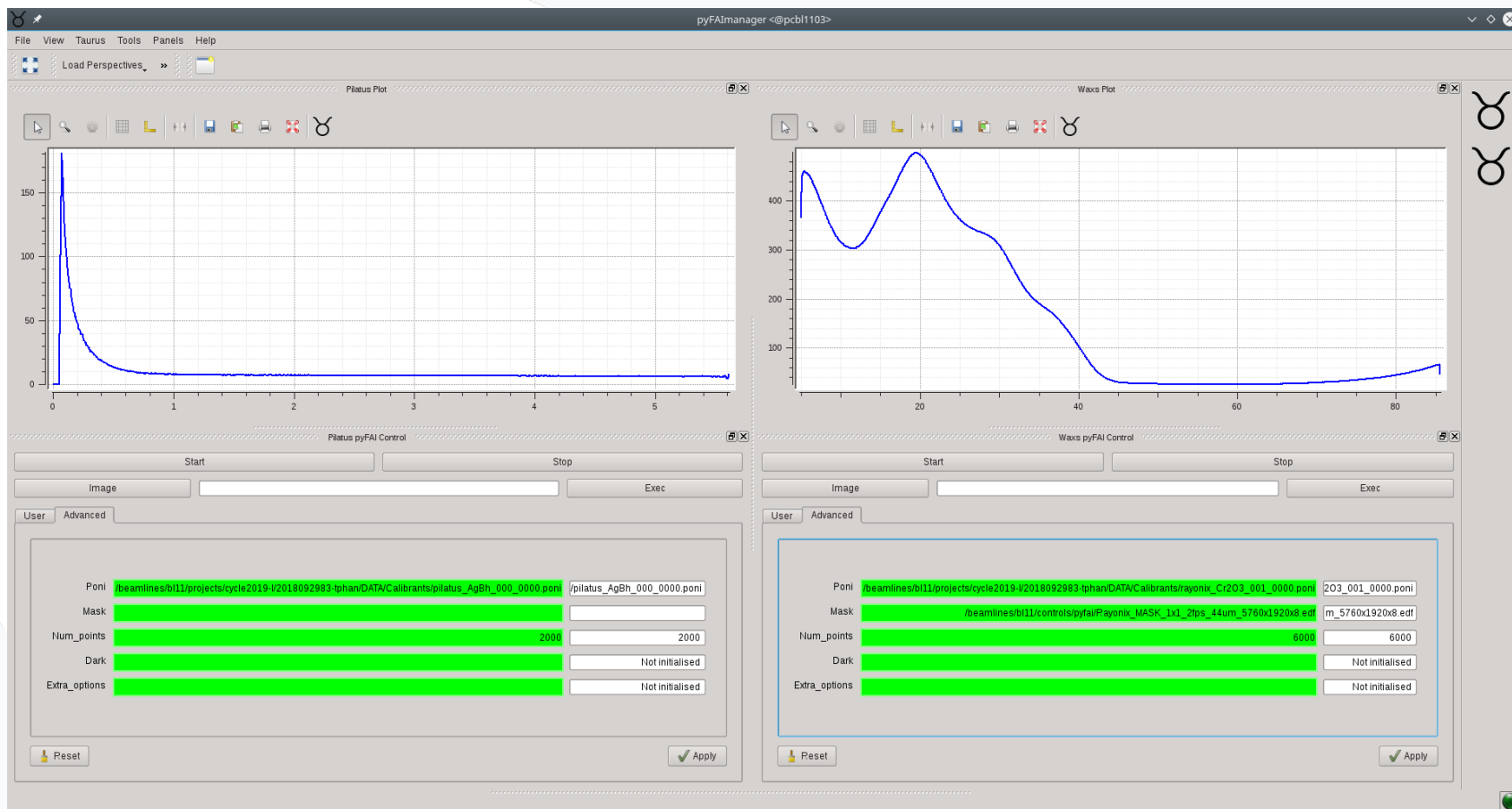
The screenshot displays the PyFAI GUI interface, which is divided into several sections:

- Top Panel:** Contains menu options (File, View, Taurus, Tools, Panels, Help) and a toolbar with various icons.
- Platus Plot:** A graph showing a sharp initial peak that decays rapidly to a baseline near zero over a time period of approximately 5 units.
- Waxes Plot:** A graph showing a multi-peaked signal that starts at approximately 350, reaches a local maximum of about 450, and then gradually decays towards zero over a time period of approximately 80 units.
- Platus pyFAI Control:** A control panel with buttons for 'Start', 'Stop', 'Image', and 'Exec'. Below these is a 'User' section with an 'Advanced' tab and a 'State' table.
- Waxes pyFAI Control:** A control panel with buttons for 'Start', 'Stop', 'Image', and 'Exec'. Below these is a 'User' section with an 'Advanced' tab and a 'State' table.

The 'State' table in both control panels lists the following parameters:

Parameter	Value	Unit	Status
Last_file_ready	/storage/bis/beamlines/bl11/projects/cycle2019-02		
Q_units	q_nm ⁻¹		Not in
Output_extension	.dat		Not in
Azimuthal_from	-180.00		
Azimuthal_to	-100.00		
Radial_from	0.00		
Radial_to	-1.00		

PyFAI GUI



The screenshot displays the PyFAI GUI interface, which is divided into several sections:

- Top Panel:** Contains menu options (File, View, Taurus, Tools, Panels, Help) and a toolbar with icons for file operations and plot manipulation.
- Plots:**
 - Pilatus Plot:** Shows a sharp initial peak at a low angle (around 0.5 degrees) that rapidly decays to a baseline near zero by 1.5 degrees.
 - Waxes Plot:** Shows a more complex profile with a primary peak at approximately 20 degrees and a secondary, smaller peak at about 10 degrees. The intensity gradually decreases as the angle increases beyond 40 degrees.
- Control Panels:**
 - Pilatus pyFAI Control:** Features 'Start' and 'Stop' buttons, an 'Image' input field, and an 'Exec' button. Below these are 'User' and 'Advanced' tabs. The 'Advanced' tab contains fields for 'Poni', 'Mask', 'Num_points' (set to 2000), 'Dark' (set to 'Not initialised'), and 'Extra_options' (set to 'Not initialised').
 - Waxes pyFAI Control:** Similar to the Pilatus control panel, but with 'Num_points' set to 6000.

Summary



Task
Manager



- Automatic Post-processing
- In paralel with experiment
- Experiment monitoring
- Faster reaction
- Interactive GUI



Thank You

Use of PyFAI at NCD - SWEET

- Current version 0.10.3
- PyFAI-saxs and PyFAI-waxs scripts
 - It uses integrate1d
 - We define radial_range, azimuth_range and normalization_factor
 - N-points: Pilatus 2000, Rayonix 6000
 - Pilatus 981 x 1043 pixels
 - Rayonix 5760 x 1920 pixels
- Mask created from Glassy Carbon image
- PyFAI-calib to create pony files

Links

- <https://www.albasynchrotron.es/en/beamlines/bl11-ncd>
- <https://www.dectris.com/products/pilatus3/pilatus3-s-for-synchrotron/details/pilatus3-s-1m>
- <https://www.rayonix.com/product/lx255-hs/>
- <http://www.tango-controls.org/>
- <https://sardana-controls.org/>
- <https://taurus-scada.org/>
- <http://lima.blissgarden.org/>