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Exploring Bluesky Data with PyMca and Tiled

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With growing adoption of Bluesky at scientific user facilities for collecting and storing experiment data, graphical data explorers can now leverage the rich metadata and structure provided by Bluesky. At NSLS-II many beamlines use PyMca, an open-source graphical desktop application ("app") for viewing and analyzing datasets during beamtimes. The datasets are generally loaded from HDF5 files and then processed by hand or in batches with specialized plugins. Missing from this workflow has been a mechanism to retrieve data directly from Bluesky's Tiled data service.

The Data Analysis and Workflow Integration group at NSLS-II has streamlined this process by embedding a Tiled data client into the PyMca Qt app as a recognized data source. When the app is launched, it connects to a Tiled server and presents the user with the available catalogs of Bluesky runs. Search and filtering of metadata from the Bluesky runs facilitate locating the datasets of interest. Tabular data columns can be selected and hooked into the existing PyMca framework for plotting and inspecting multiple one-dimensional data traces. All functionality is accompanied by unit tests of the logic and graphical elements to ensure reliability.

Complex Scattering beamlines at NSLS-II are integrating PyMca with Tiled into user workflows. The app is deployed on virtual desktop infrastructure so that any facility user or staff can remotely process their data. Environment variables and Tiled "profiles"simplify customization of deployments for each beamline or remote user. Live-streaming of data from Tiled into PyMca plots will provide decision-making feedback during beamtimes. These strategic developments deliver data remotely and securely into analysis apps that are already familiar to facility users.

Authors: GILES, Abigail (National Synchrotron Light Source II, Brookhaven National Laboratory); LOHMOLDER, Joshua (National Synchrotron Light Source II, Brookhaven National Laboratory); SHAFER, Padraic (National Synchrotron Light Source II, Brookhaven National Laboratory)

Presenter: SHAFER, Padraic (National Synchrotron Light Source II, Brookhaven National Laboratory)

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