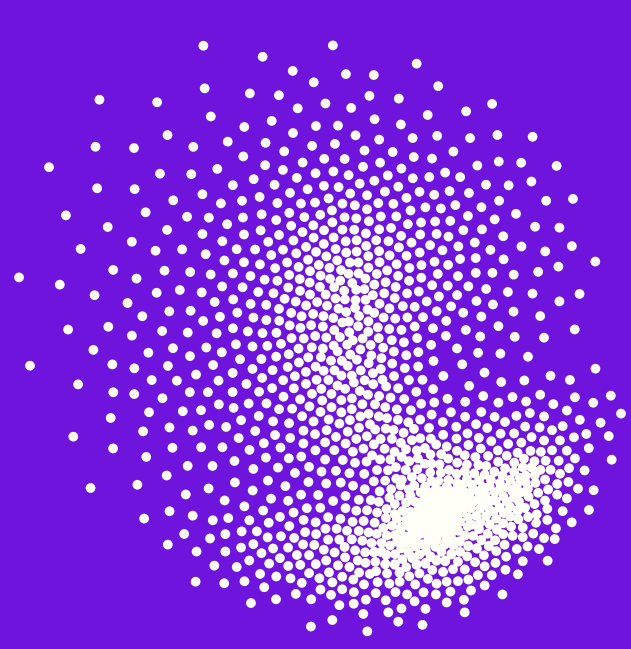




Recent Development of the Pixelator Instrument Control System

Benjamin Watts¹, Simone Finizio¹, Russel Berg², Markus Weigand³, Joerg Raabe¹

¹Paul Scherrer Institute, PSI-Villigen, Switzerland

²Canadian Light Source Inc., Saskatoon, Canada

³Max-Planck-Institut für Intelligente Systeme, Stuttgart, Germany

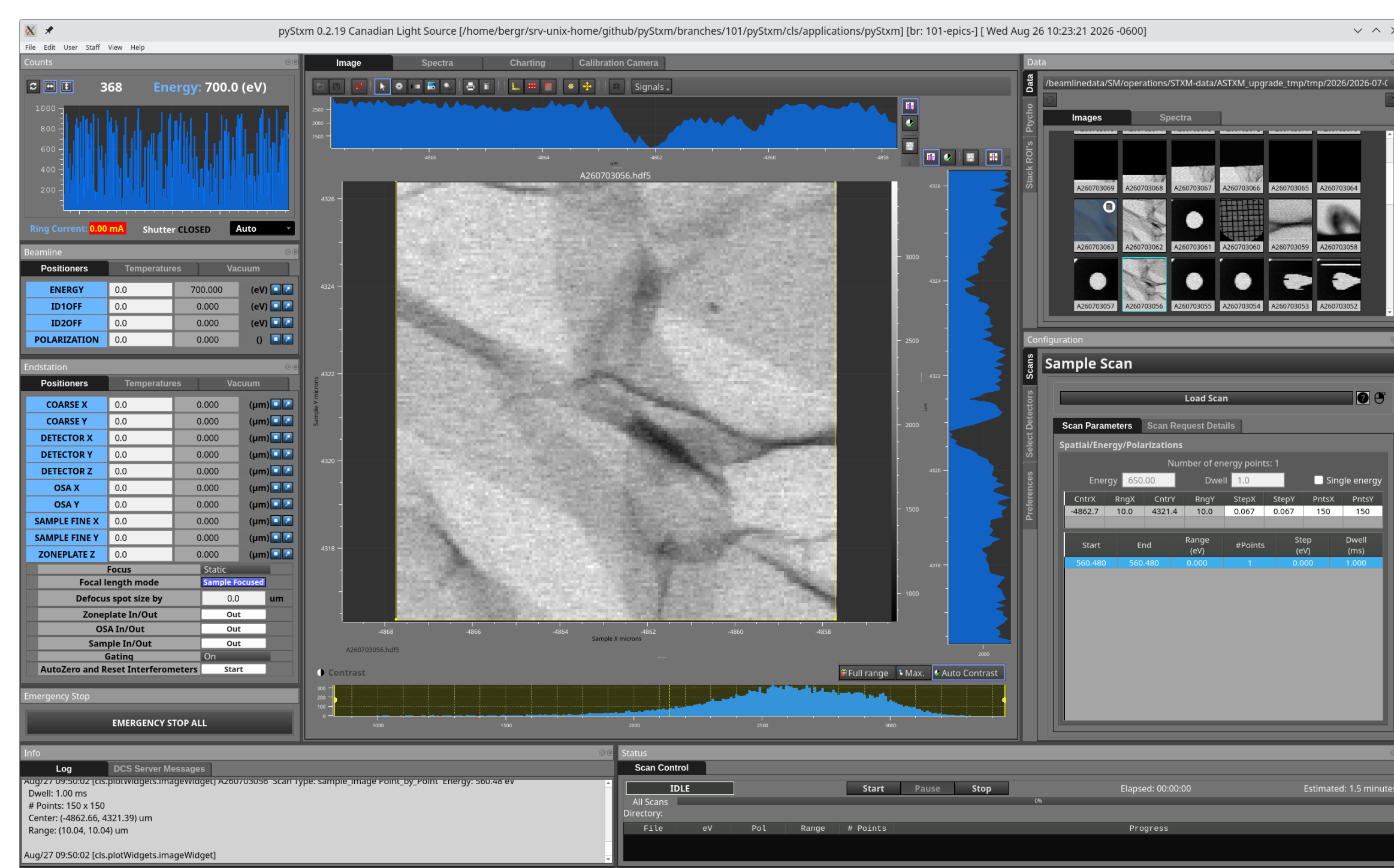
Introduction

Pixelator is a software project for controlling scanning instruments with a focus on X-ray imaging techniques such as a STXM (scanning transmission X-ray microscope) and ptychography. The project began as a collaboration between the Paul Scherrer Institute, the Max-Planck-Institut für Intelligente Systeme and Semafor Informatik & Energie AG, and has been in standard use since 2012. Pixelator is highly configurable, allows coordinated scanning of multiple axes (including for 3D laminography measurements), and has tight integration with interferometric position metrology. Modular hardware support makes it easy to interface with new type of hardware and hardware controllers. Meanwhile, a clean server-client architecture means that all scan logic is executed in a stable linux environment while user input is accepted by a GUI running on any machine with network access.

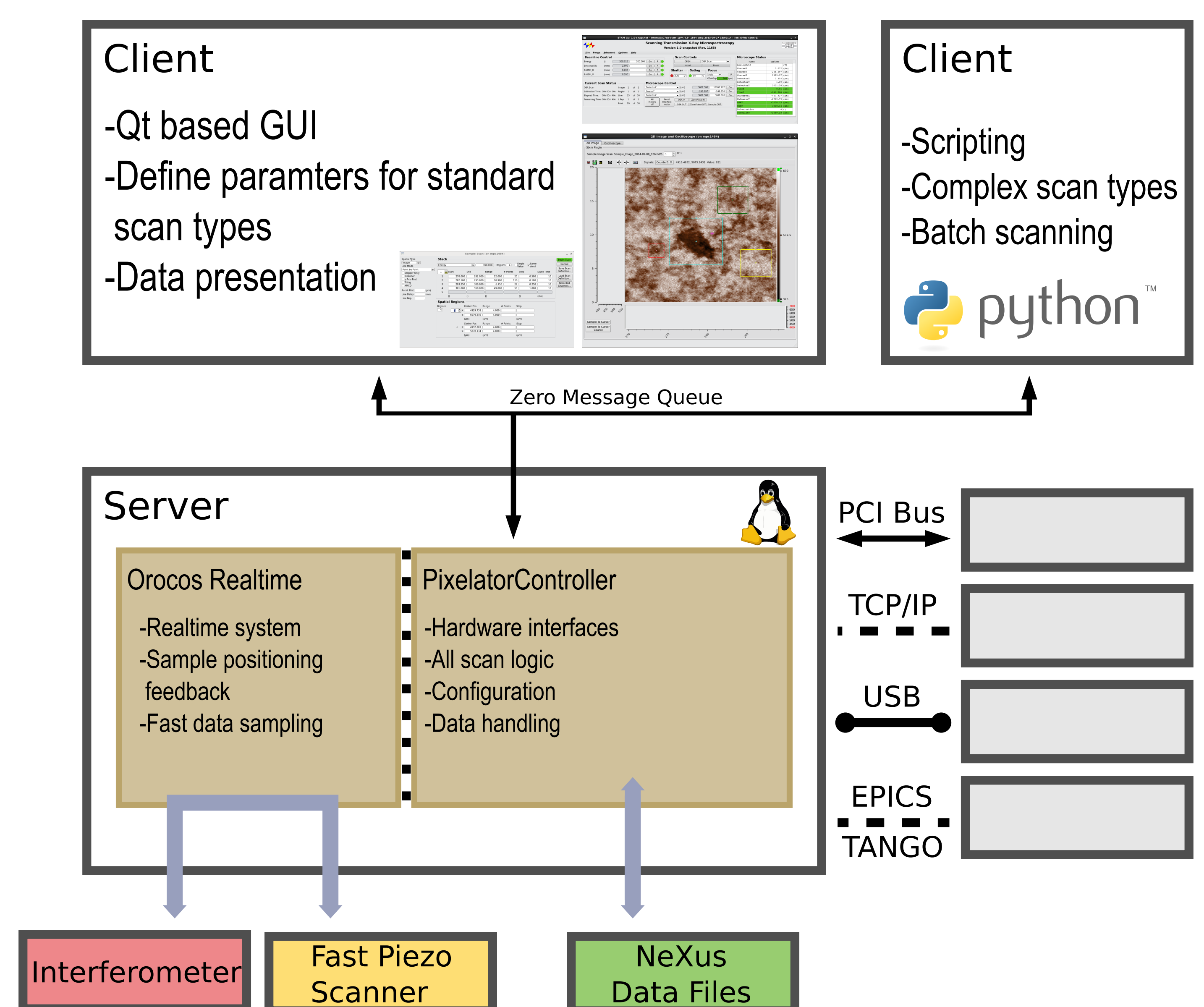
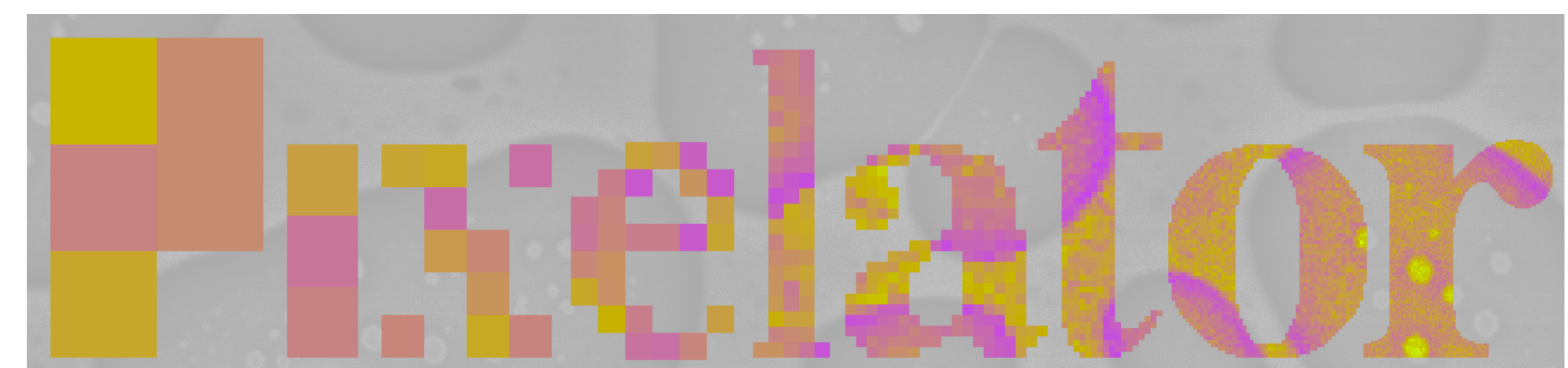
Recent Developments

Recent client-side developments include the reimplementation of the basic GUI to remove dependence on the proprietary Intens libraries, and integration with pySTXM (developed by Russ Berg at the Canadian Light Source) as an alternative GUI with advanced presentation features. Several new server-client message types have been added to Pixelator in order to enable pySTXM features for the live monitoring of detectors and scan-file display. Documentation of configuration options and server-client messaging has been extended.

On the hardware side, support for PandAbox has been implemented and is in standard use at the Swiss Light Source, reading interferometer values and detector counts with high frequency (up to 100 kHz) for improved precision and providing a modern alternative to NI PCI cards. The high sampling rate of the PandAbox has enabled the development of super-sampling STXM which significantly improves the positioning precision of measurements and enable higher resolution images.

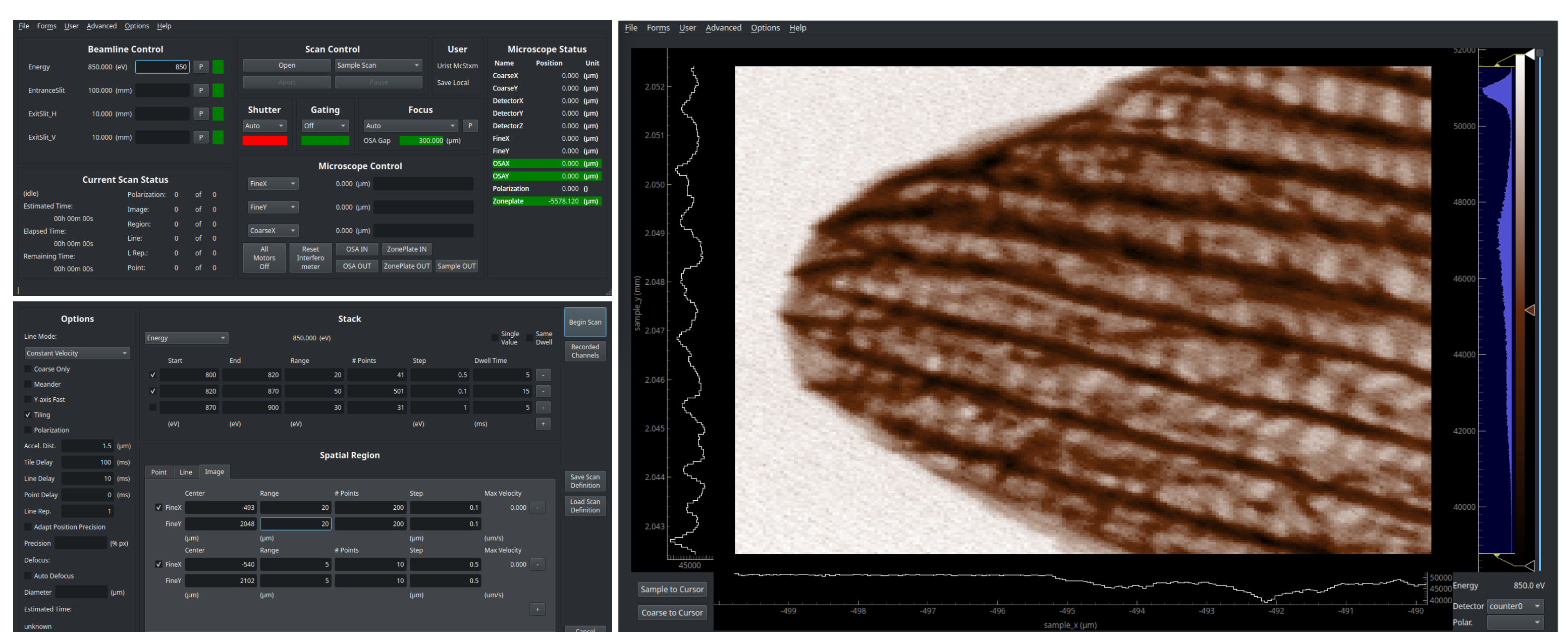


pyStxm (Russ berg, CLS) can be used as a GUI client for Pixelator. Work continues to align the operating models of pyStxm and Pixelator (with changes to both) in order to allow a broader ranger of instrument configurations.



Roadmap

The current focus of Pixelator development remains on GUI clients and the removal of the Intens library dependency. Following this work, a number of the client-server messages have been marked for overhaul to improve simplicity and compatibility with different clients (e.g. pyStxm) and ptychography scan visualisation. Further messaging needs to be implemented for Orocos in order to properly implement the super-sampling scan mode and provide more convenient access to PID parameters. Work to improve support for PandAbox will also continue. Further goals include interoperability with Orphyd (bluesky and BEC) and with automatic logbook entries (e.g. ELOG, SciLog, HedgeDoc).



The Pyxcellent GUI client for Pixelator is a Python based replacement of the original Intens based client. The presentation and communication are separated, so the library can be imported for use as a scripting client. While many basic features have already been implemented, work continues to implement all functions available in the Intens GUI.