

# BsxCuBE: a Control System for BioSAXS Experiments



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## Introduction

Many synchrotron centres are developing beamlines specialized in biological small-angle X-ray scattering (BioSAXS). However, few have a system that fully controls and processes the data of the experiments. At the ESRF, a new system named BsxCuBE (BioSAXS Customized Beamline Environment) is being developed to fulfill this need. Its aim is to control the experiments at beamline ID14-3 in an automated way by integrating disparate tools into a single interface.

## Current Status

BsxCuBE was built using an in-house framework (Bliss Framework 4) which allows creation of sub-windows (Bricks) which are arranged in a main window to form a complete application. The communication with devices is separated into another layer called the control objects which connects to SPEC, ESRF experiment sequencer, and TACO and TANGO, the device server layers. The Python/Qt development was carried out in a integrated development environment called Eclipse with extra plugins, namely Subclipse (SVN control versioning) and PyDev (python coding and debugging).

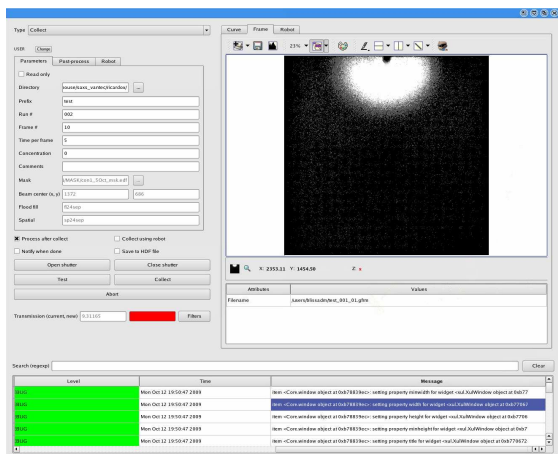


Fig. 1 – BsxCuBE during a data collection.

Currently, BsxCuBE can perform the following actions:

- Start and control a data acquisition according to user's parameters;
- Display images (and 1D curves) being acquired from the detector apparatus;
- Post-processing of the 1D curves, such as cropping or subtracting;
- Reprocess the collected data with different parameters;
- Control different components of the beamline (shutters, filters, ...);
- Control of the sample changer to enable automatic batch experiments.

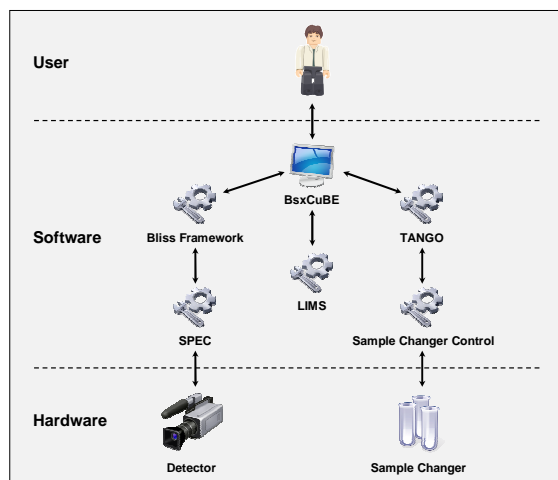


Fig. 2 – BsxCuBE interaction with the user and different components.

## Future Developments

- Connection to the ESRF Laboratory Information Management System to provide automatic logging and sample tracking.
- Support of a new standard storage paradigm called Hierarchical Data Format, to store data (images, curves and scans) and corresponding metadata.
- Integration of further post-processing operations of 1D curves.

## Conclusions

The system has been in operation over the last seven months with promising results: it is capable of successfully controlling a data acquisition procedure and users feel comfortable using it. BsxCuBE can display, in near real time, the data (i.e. images) being acquired as well as the corresponding 1D curves. At this stage, post-processing of the 1D curves is also possible, such as cropping, subtracting or filtering according to the radiation damage. This new control system has allowed good quality BioSAXS data to be collected by real users, some with little experience of the experimental techniques.

## Acknowledgements

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