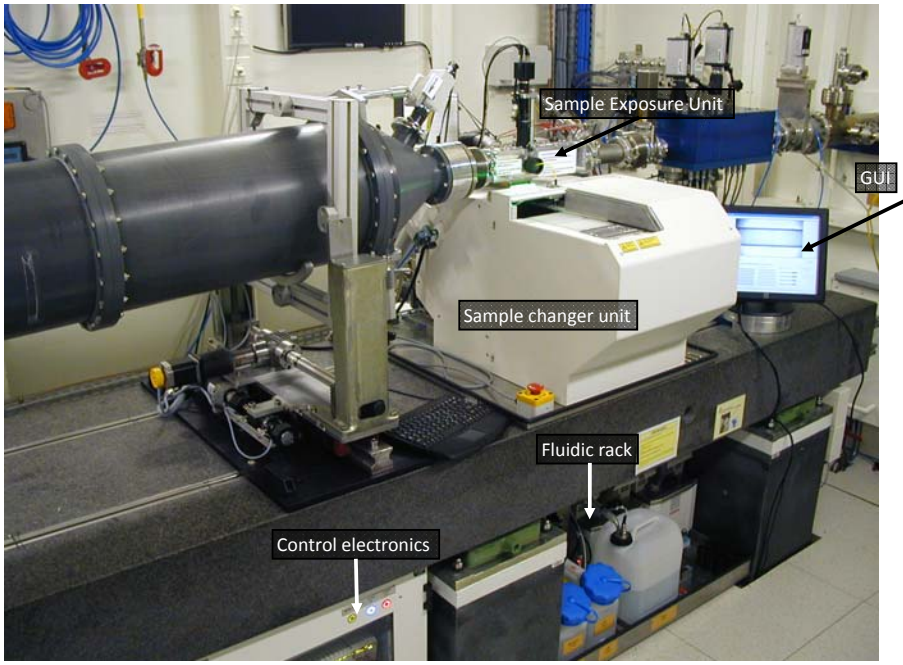
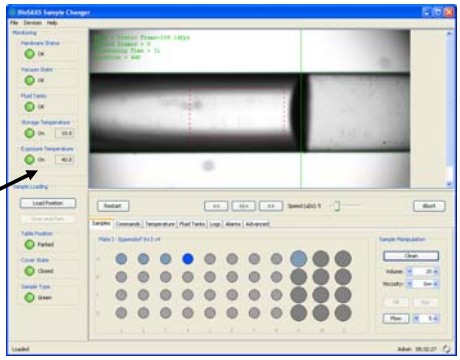
BioSAXS
Automated sample environment

Small-angle X-ray scattering (SAXS) allows studying native macromolecules, from individual proteins to large complexes, in solution under nearly physiological conditions. SAXS provides low resolution three-dimensional models, and is a method of choice to study kinetics.
This BioSAXS sample environment is designed to expose automatically to x-rays, micro-volumes of solution stored in SBS Microplates. Down to 5 micro-litres of solution can be automatically loaded in a vacuum mounted glass capillary. After exposure, the fluid path is cleaned and dried automatically. Liquid handling features associated with an in-line spectrometer allows for sample concentration measurement, dilution or additions.



BioSAXS sample changer at the ESRF ID14-3 beamline



Key features

- **Solution transfer** down to **5 µl**
- **Sample viscosity** optimisation
- **Typical cycle time 50 sec :**
  Loading : 15 s
  [Unloading : 15 s]
  Cleaning : 20 s
- Static and **flow** sample exposure modes
- **Liquid handling**
  - Dilutions - Additives
- **In line spectrophotometer**
  for samples concentration measurements

Control system

- **Control hardware** based on **Beckhoff EtherCat** field bus electronics and **TwinCat** real time PLC and motion control
- **Windows XP Control software** with **Java** core and **Python** scriptable processes
- **GUI** with **touch-pad** mode for local control
- **Full remote control** (Tango, Tine, Epics, Web Services ...)

Additional features

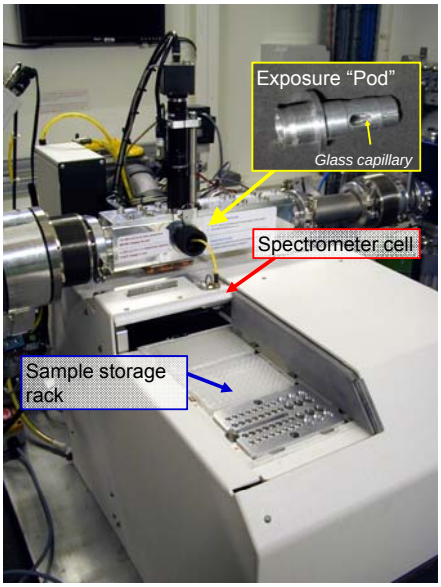
- **Auto configuration** of the machine according to the thermo-regulated blocs installed
- **Auto check** of needle position after sample plates loading
- **Smart pipetting** with **liquid level detection** in sample wells
- **Automated** camera **focus** and **dead volume determination** after installation of a new sample exposure Pod
- **Capillary cleanness tracking**

Sample exposure

- In-vacuum **exposure cell** with 30 µm wall **glass capillary**
- **Exposure capillary** mounted in easily exchangeable **"Pods"**
- Temperature control **2-60 ºC**
- Smart **sample positioning** in exposure capillary using **image computing**
- **Sample Flow during exposure**

Sample storage

- **3x slots rack** to receive bar-coded **thermo-regulated blocks** for :
  - 96 or 384 wells SBS Microplates
  - 96 deep wells SBS Microplates
  - 8 wells Eppendorf strips (200ul) + individual 1.5 ml wells (buffers)
  - Custom holder
- **Temperature 4 to 40 ºC** (common)
- **Rack parked under cover** to minimise sample evaporation and condensation
- **Bar coded** SBS Microplates



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