



SIRIUS: a multipurpose scattering and spectroscopy beamline for **SOLEIL** SYNCHROTRON

INSTITUT CARNOT MICA

ANR

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A beamline for experiments on Soft and Hard interfaces

- Liquid interfaces & Langmuir films,
- Biomimetic systems,
- Polymers on liquid/solid surfaces,
- Complex interfaces,
- Surface self-assembly,
- Liquid crystals.

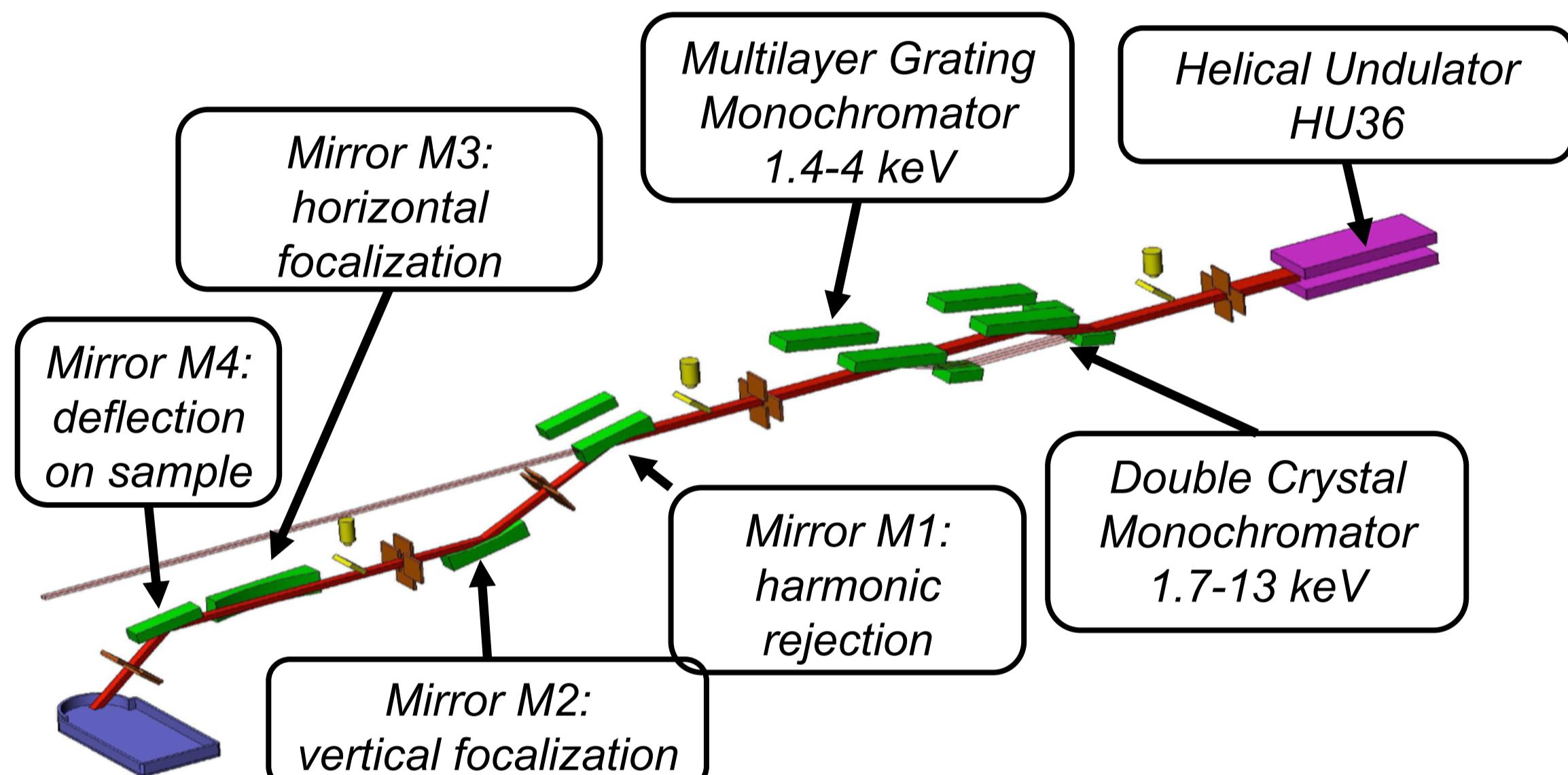
- Semiconductors,
- Functional oxides,
- Magnetic materials.
- Photovoltaic materials,
- Nanoelectronics.

A focus on Grazing Incidence techniques

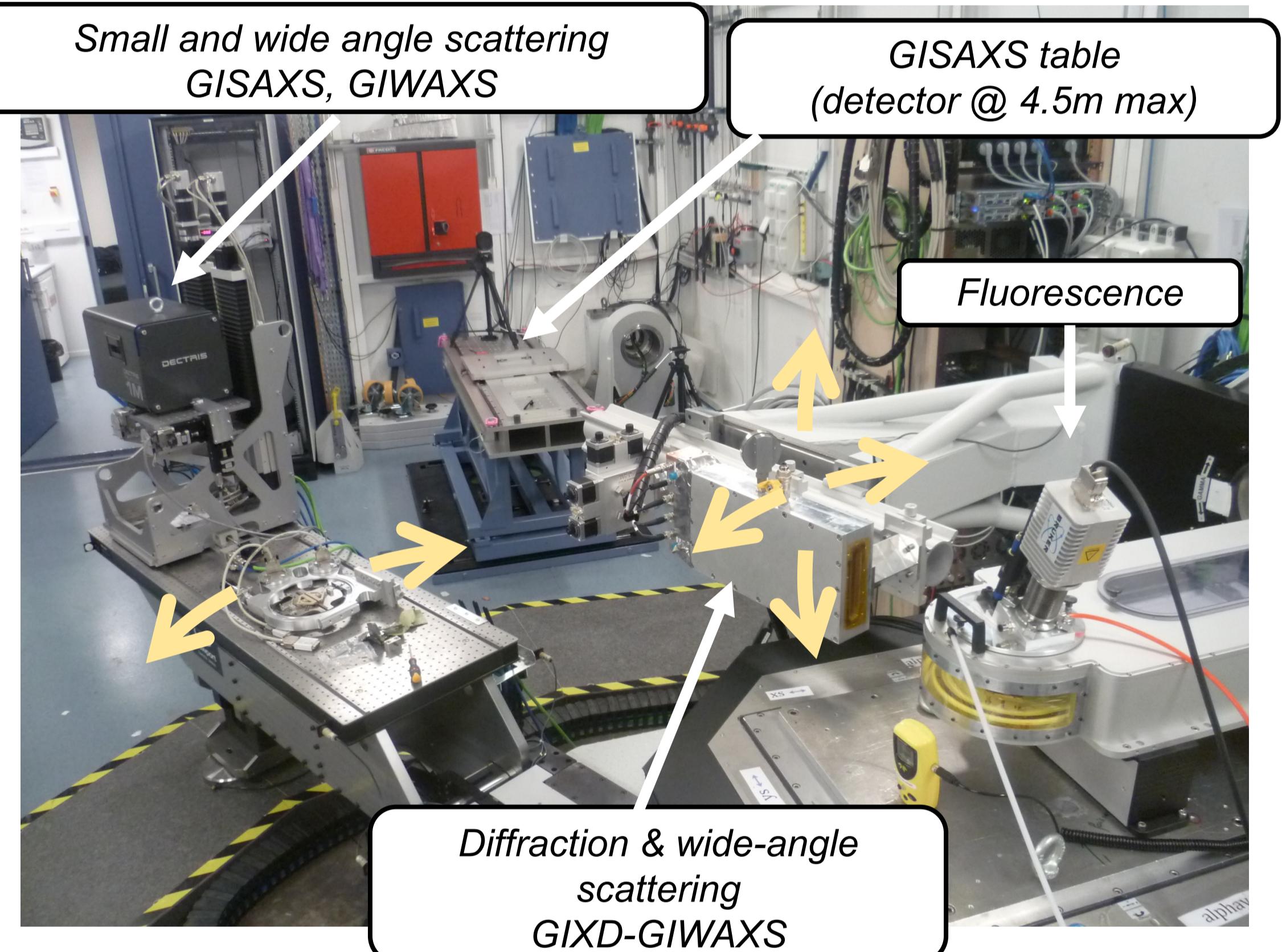
- Surface diffraction (GIXD),
- Wide-angle scattering (GIWAXS),
- Small-angle scattering (GISAXS),
- X-ray Fluorescence,
- X-ray Reflectivity.

- Molecular structure,
- Nanoscale organization,
- Chemical sensitivity,
- Camera & microscope for *in situ* imaging.

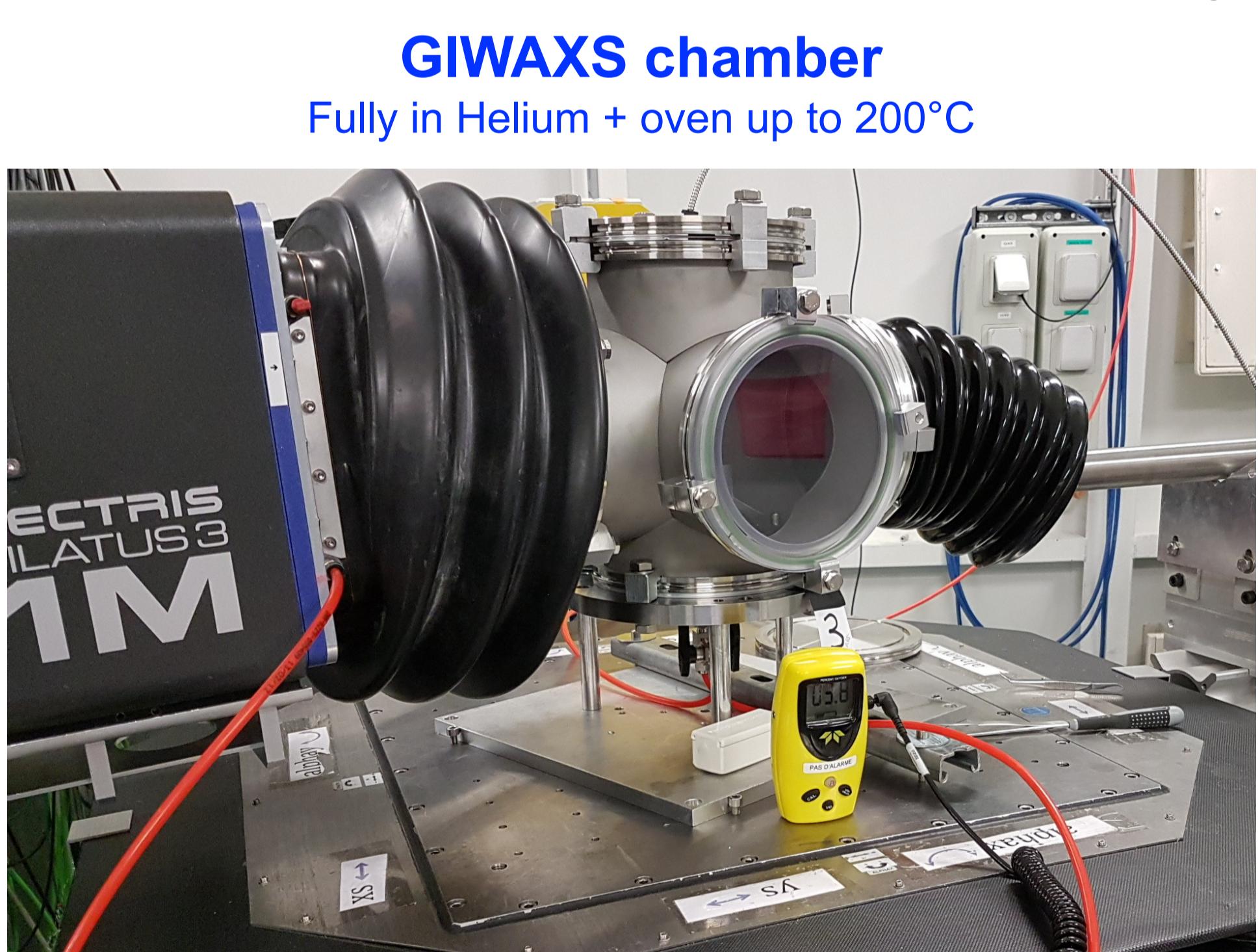
- Energy range: 1.4 – 13 keV
 - Access to absorption edges of light elements relevant for soft matter systems (Ca, Cl, Cd, S, P, K, ...).
 - Diffraction and scattering techniques around the optimum at 8-10 keV.
- Minimum beam size @ sample: 100 µm x 50 µm (H x V)
 - Down to 10 µm x 10 µm with lenses (1st semester 2022)



Example of multiple techniques available with the Langmuir trough

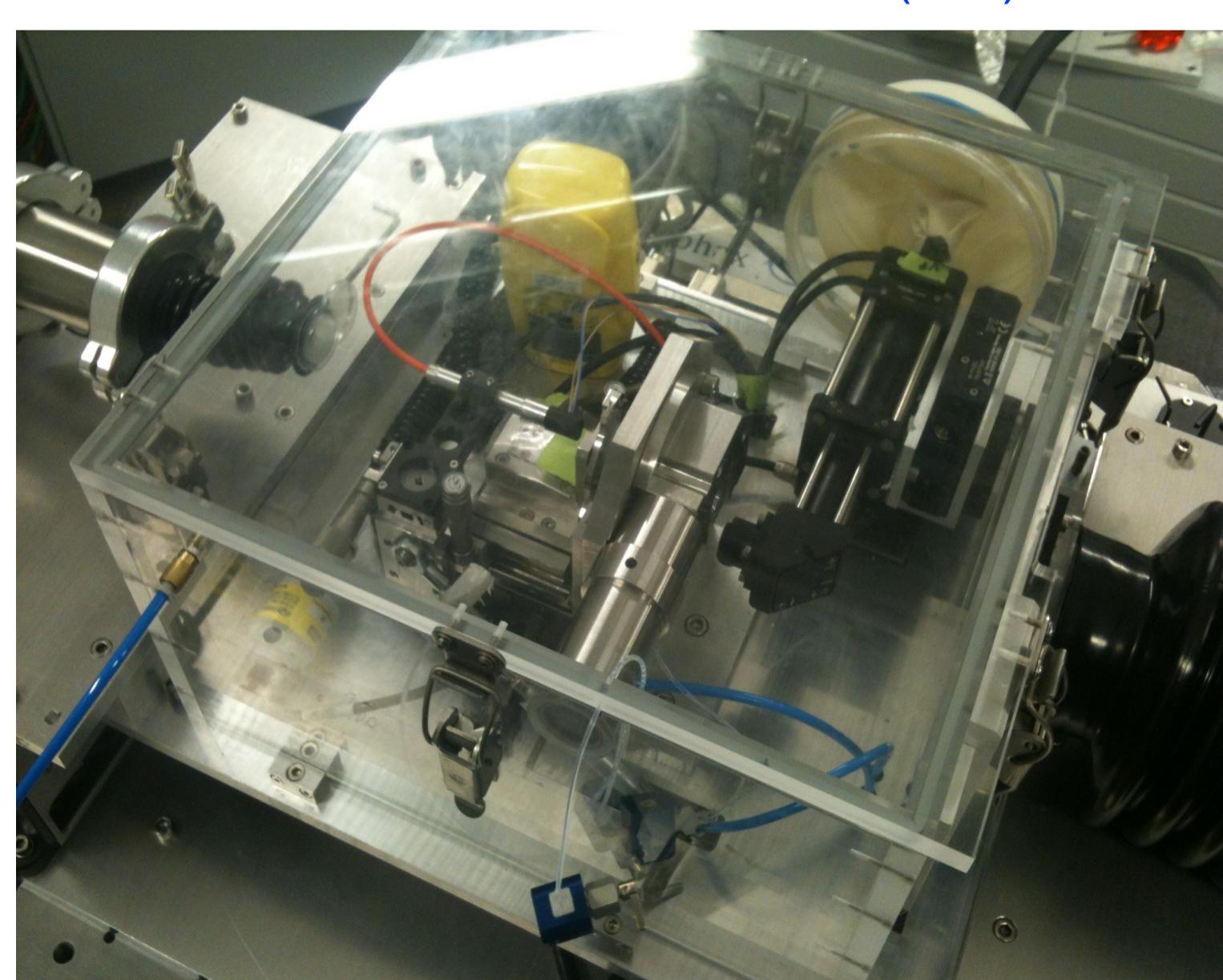


Various techniques and sample environments



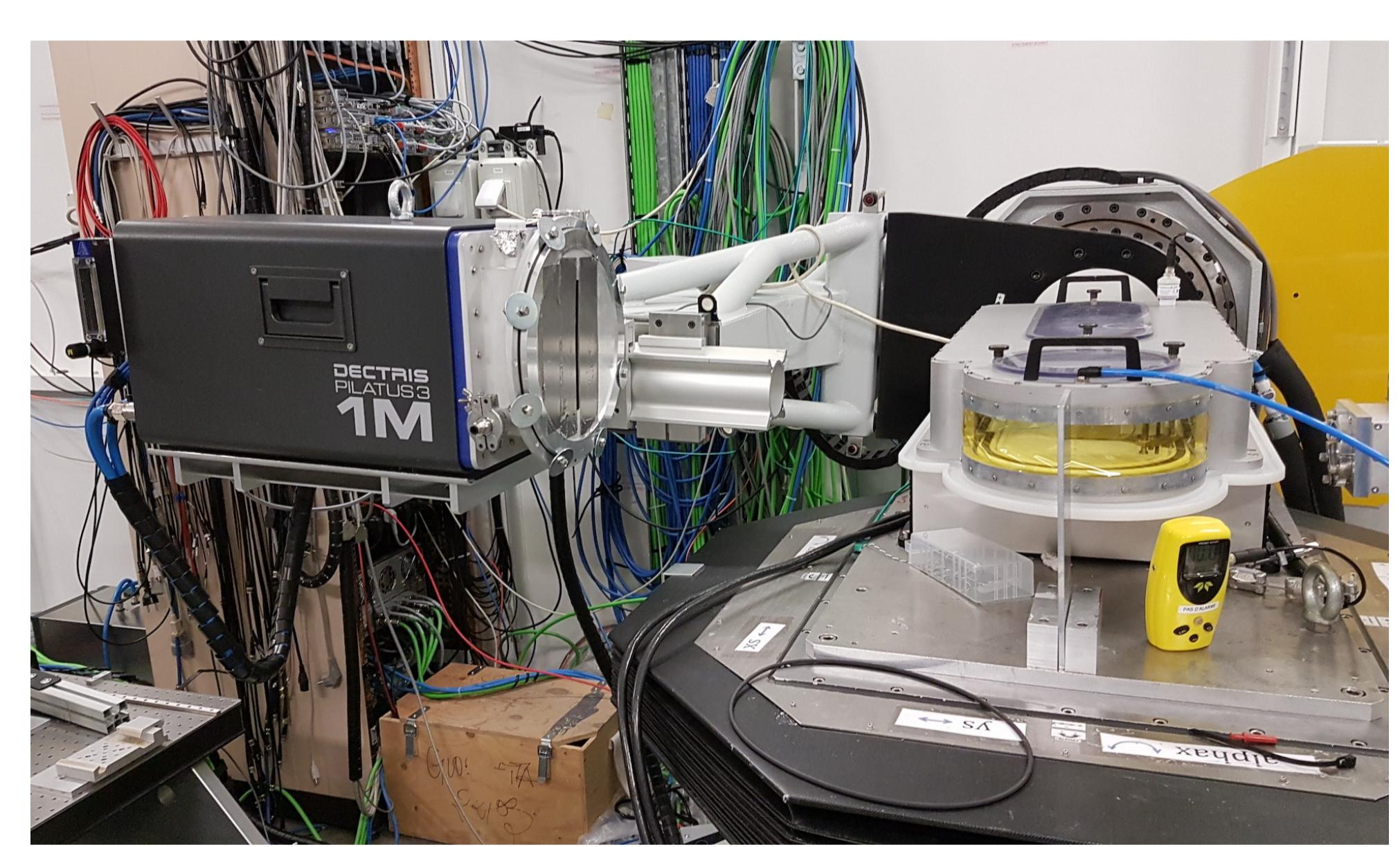
Surface Force Apparatus + X-ray scattering

Collab. with P. Kékicheff (ICS)



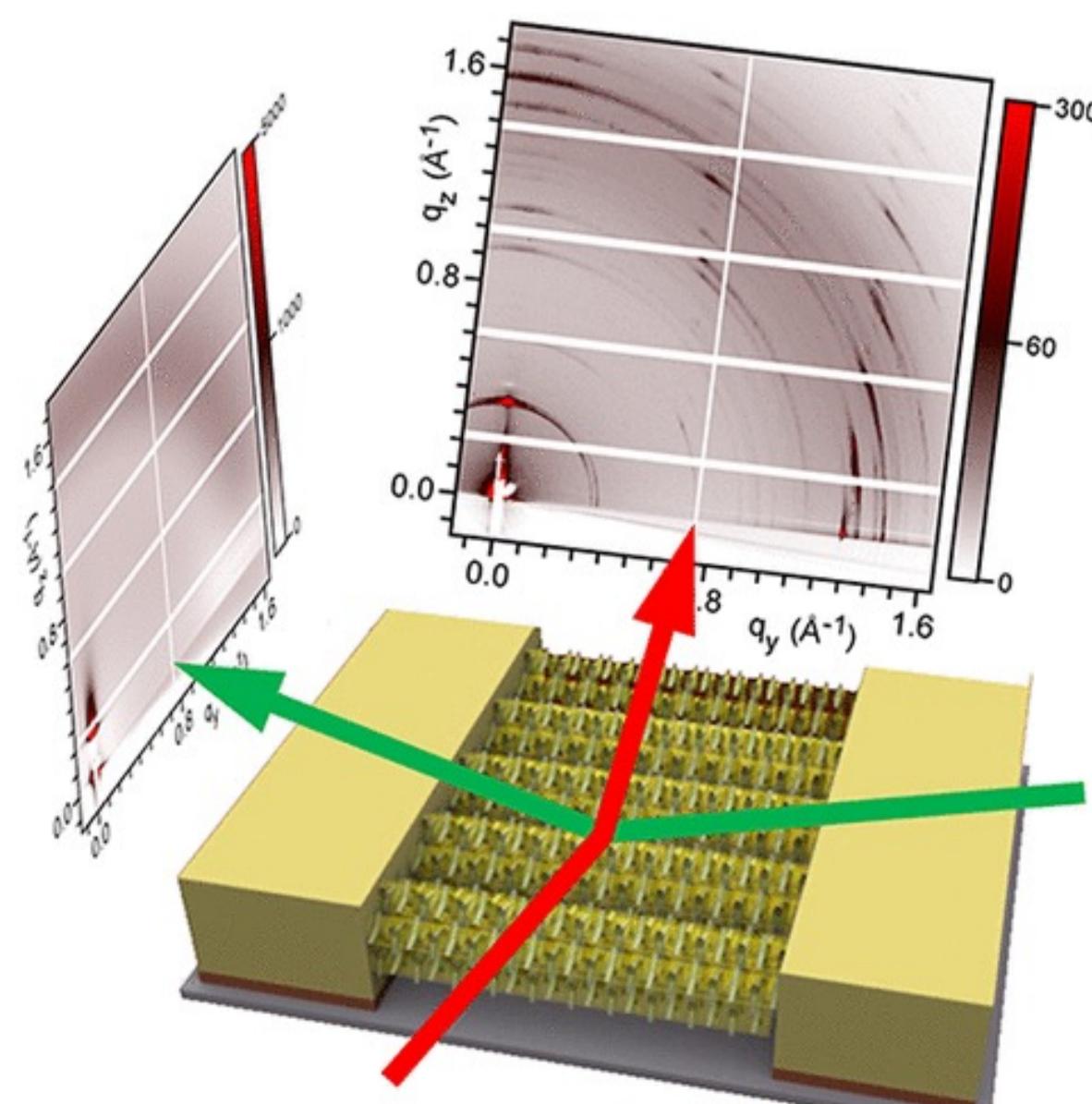
X-ray reflectivity on liquids

Specular and Off-Specular with 2D detector



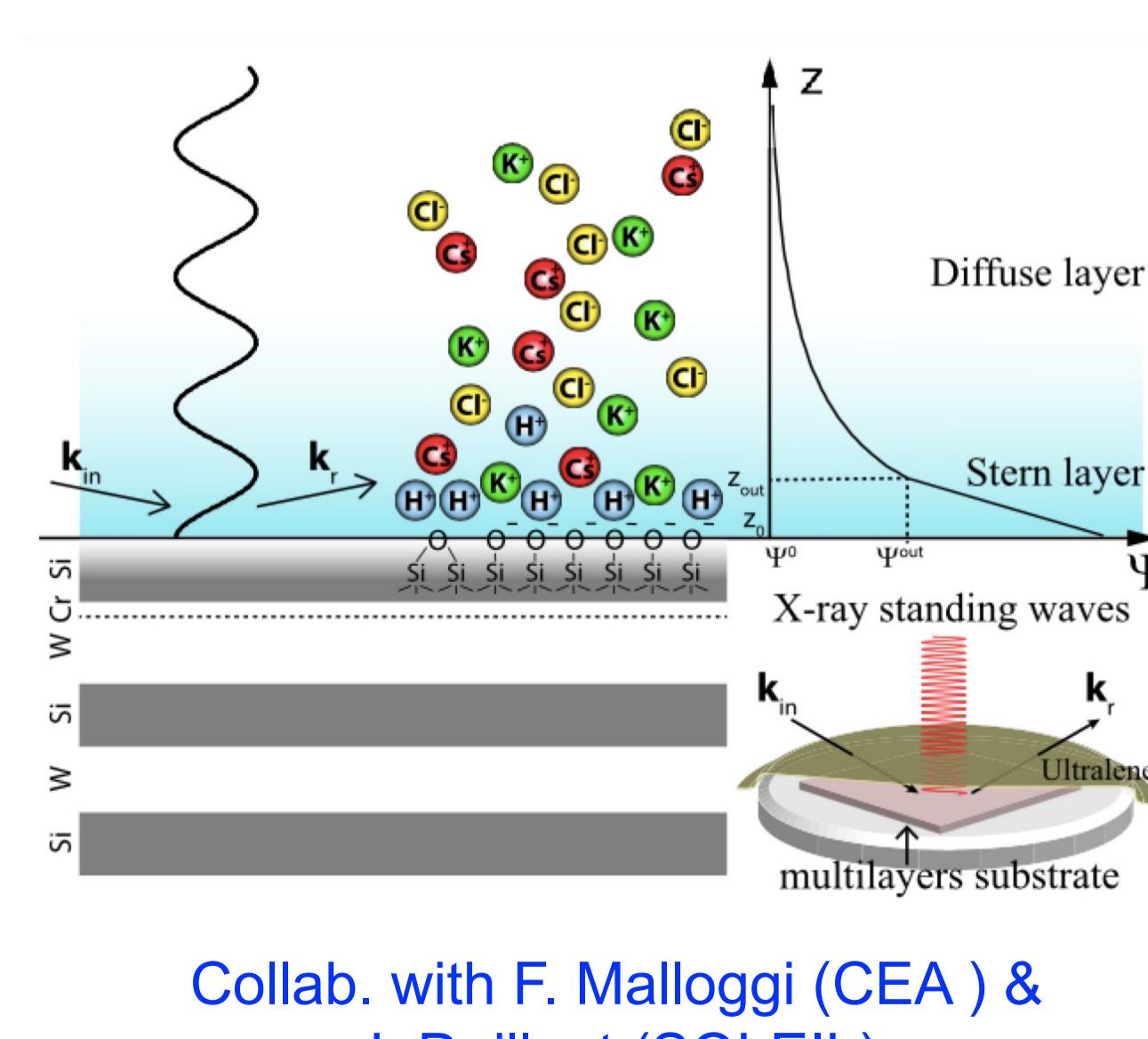
Structural characterization of nanowires between microelectrodes

Original GIWAXS measurements to overcome beam path obstruction



Distribution of ions close to charged solid interfaces

X-ray Standing Waves + Fluorescence
→ Interfacial concentration profiles with ionic specificity

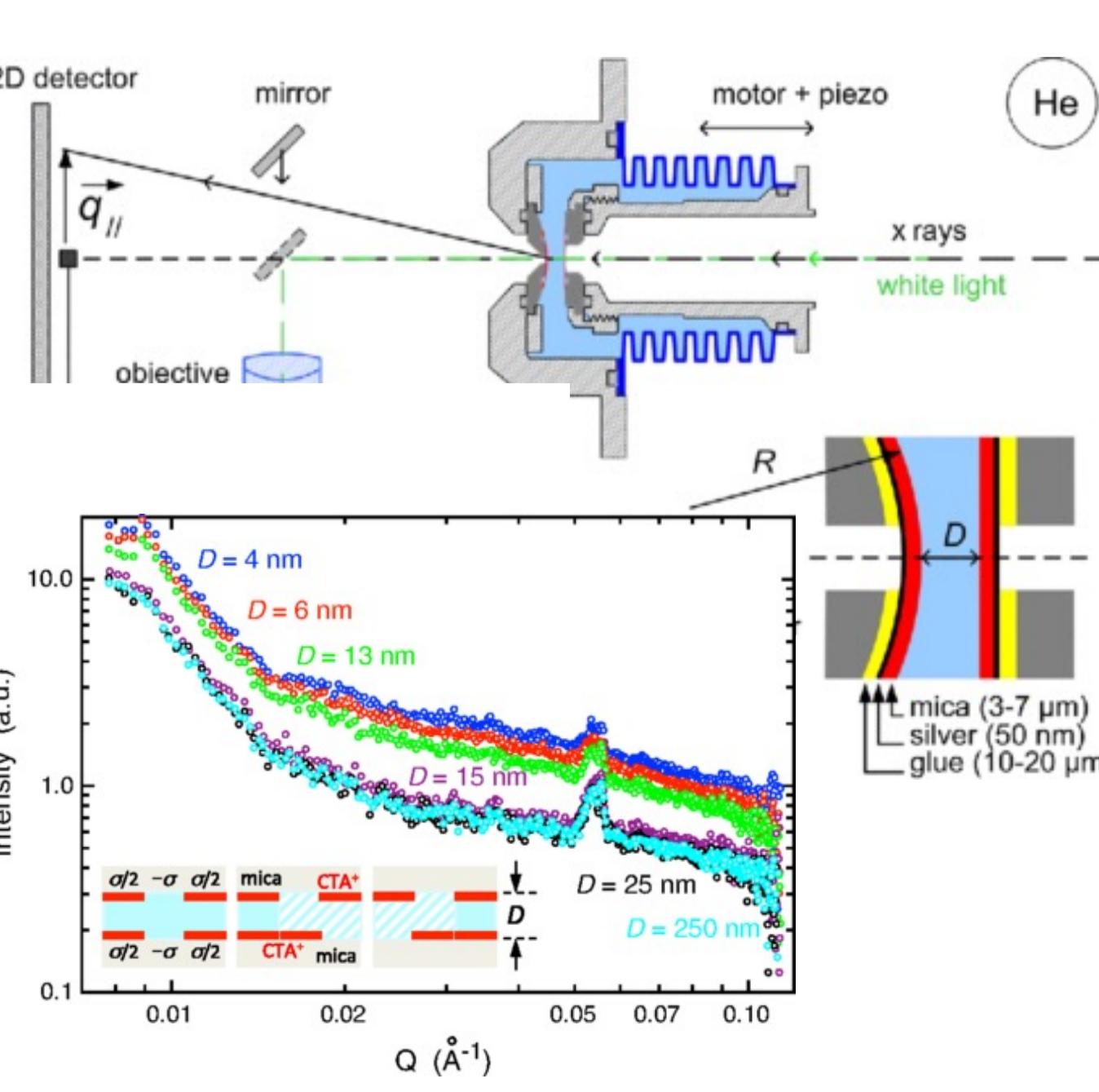


M. Galerne et al. Appl. Polym. Mater. 2021

Lateral correlations in confined surfactant solutions

SFAX = coupling SFA + SAXS

→ In-plane correlations under controlled nanoconfinement



SIRIUS: opportunities for the study of surfaces and organized molecular films

- ✓ Structural studies from Å to µm,
- ✓ Chemical composition of interfaces,
- ✓ Time resolved (down to 0.1s),
- ✓ Scanning in energy possible,
- ✓ Coupling between various techniques,
- ✓ Numerous sample environments.

→ Do not hesitate to contact us!

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