SMALL & BRIGHT.

PETRA III beamlines P03 and P10 deliver brilliant X-ray beams down to nanometer sizes.

The micro- and nanofocus X-ray scattering (MiNaXS) beamline P03 of PETRA III is dedicated to simultaneous small- and wide-angle X-ray scattering combined with a focused X-ray beam in the energy range of 8 keV to 23 keV. By providing a very high photon flux and long focal distances, MiNaXS allows for investigating heterogeneous samples in-situ on multiple length scales, from the molecular level to large scale domains. In the time regime, milli-second resolution has been shown in combination with a micro-beam. Due to its flexible setup, a multitude of sample environments for investigating thin films and bulk materials are possible. In detail, the features of beamline P03 are:

- Adaptable, optimized X-ray beam sizes in the micro-focus range using BeCRLs
- A dedicated nano-focus X-ray beam with <100 nm beam size, implemented in collaboration with Kiel University
- A dedicated microfluidic setup implemented in collaboration with TU München and Bayreuth University
- An in-situ imaging ellipsometer in combination with micro-beam grazing incidence small-angle X-ray scattering, implemented in collaboration with TU München
- In-situ solution and vacuum deposition techniques for thin film investigations
- Real space information by in-situ optical microscopy and ex-situ AFM

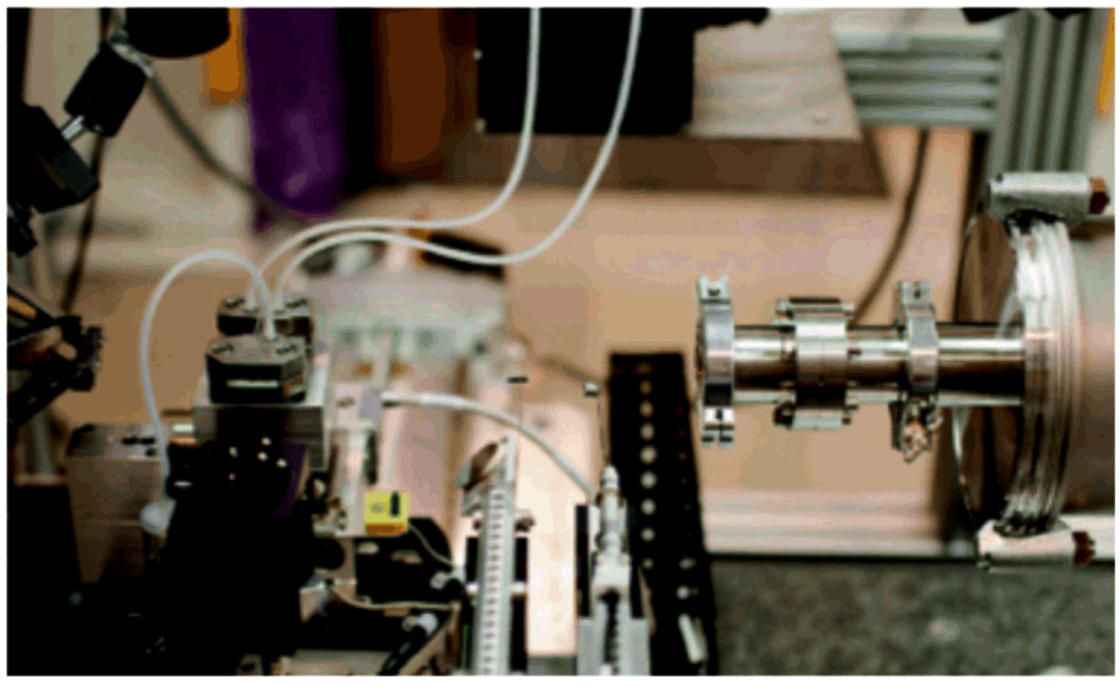

Image of a combination of in-situ microfluidics and micro-beam grazing incidence small-angle x-ray scattering mounted at P03.

The Coherence Beamline P10 uses the extreme brightness of PETRA III to enable and develop coherent X-ray scattering techniques in the medium hard X-ray range. Main techniques are X-ray Photon correlation spectroscopy (XPCS) and Coherent Diffraction Imaging (CDI). A variable combination of BeCRLs allows one to focus the full transverse coherent portion of the X-ray beam at the sample position.
The beamline P10 features two experimental hutches to accommodate multiple instruments:

- A 4-circle diffractometer in combination with a 5 m long flight-path. It allows coherent scattering experiments in SAXS and GISAXS geometry as well as in horizontal scattering geometry at large angles ($2\Theta<30°$).
- A SAXS setup especially for soft matter samples uses a 20 m flight-path with larger beam sizes at reduced flux densities.
- A rheometer in plate-plate geometry implemented in a vertical scattering setup combines time-resolved SAXS with rheology
- A 6-circle diffractometer will be used to enable XPCS and CDI studies at large wavevector transfers.
- The University of Göttingen implemented a holography endstation using KB focusing optics to couple a focused nanometer sized X-ray beam into X-ray waveguides creating a highly coherent divergent beam for holographic imaging.

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