System Upgrades with Incoatec´s Unique Microfocus Source and Scatterless Pinholes

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Upgrading Existing Diffractometers with IµS

Incoatec offers a unique possibility to upgrade your existing diffractometer by installing our high-performance, air-cooled and low-power microfocus source IµS.

You have a Bruker AXS, Marresearch, Nonius, Rigaku, Huber or some other system?

Brighten it up with Incoatec´s state-of-the-art microfocus X-ray source IµS!
A significant increase in flux density of up to $2\cdot10^{10}$ ph/(s·mm²) and smallest beam cross-sections of down to 95 µm can be obtained. With an IµS upgrade you will get the highest standard of quality, precision and safety Made in Germany. Our long-standing experience is based on more than 60 upgrades of IµS integrations into nearly all existing X-ray diffractometers worldwide. Your local service contact can be involved in the on-site installation. Additionally, Incoatec provides profound customer support during the whole project and beyond. We take care!

Your upgrade options:

- Source, optics and beam conditioning elements
- Single source upgrade for XRD, SCD, (GI)SAXS, XRR and many more applications
- Dual wavelength setup by adding IµS as complementary source
- Cu, Mo, Ag, Co and Cr radiation (others on request)

Your benefits:

- No maintenance, only single phase power and no water cooling required
- 3 years warranty
- Implementation into Bruker software or stand-alone operation (remote control)
- Maximum installation down time of only 2 - 4 days
- Full integration into existing safety circuits, new safety concept development on request
- Full compliance with European Machinery Directive 2006/42/EC

Upgrades on Bruker AXS Systems

Incoatec supports full integration into two decades of Bruker´s X-ray product portfolio with worldwide project experiences. This includes former Nonius diffractometers, all generations of Bruker D8 machines and the Bruker SAXS product lines. Close teamwork with the Bruker AXS system developers and local service staff ensures the highest standard of system integrity.

Nonius Kappa APEX II, FR 590 in Jena, Germany

Bruker APEX II DUO IµS in Düsseldorf, Germany

Bruker NANOSTAR (IµS and SCATEX) in Vienna, Austria

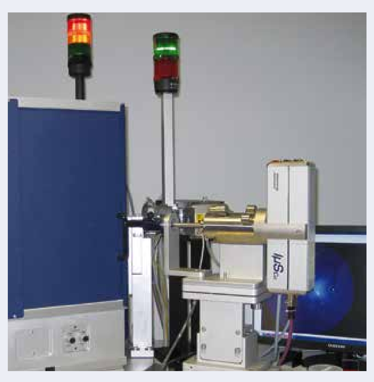
Bruker D8 DISCOVER GADDS in Karlsruhe, Germany

Upgrades on Other Systems

Incoatec has upgraded more than 30 other commercial X-ray diffractometers from all over the world. An audit of the existing radiation safety system according to your local safety demands with required upgrades is mandatory. Together with detailed experiences about third-party controller systems Incoatec offers a whole in one diffractometer solution even with these non-Bruker machines.

Marresearch 345 dtb in Basel, Switzerland

Replacement of Rigaku RU-200 generator in Boulder, USA

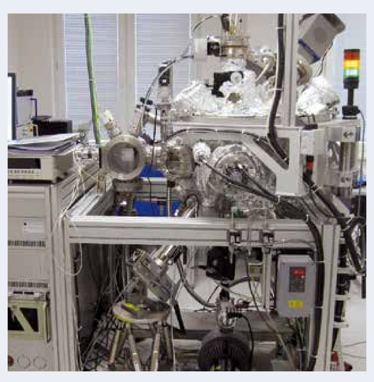


STOE IPDS II in Mainz, Germany

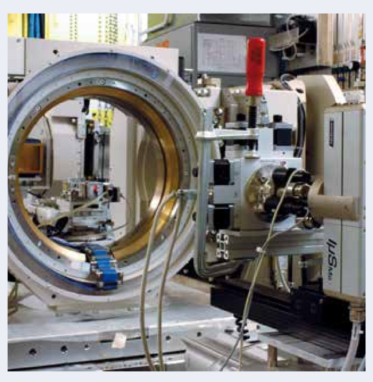
Huber goniometer with APEX II detector in Newcastle, UK

Special Engineering

Cutting-edge ideas deserve state of the art technical support. An international team of engineers, physicists and chemists with a broad background in all kinds of scientific applications find the optimal solution also for your specific application. Contact us, challenge us.

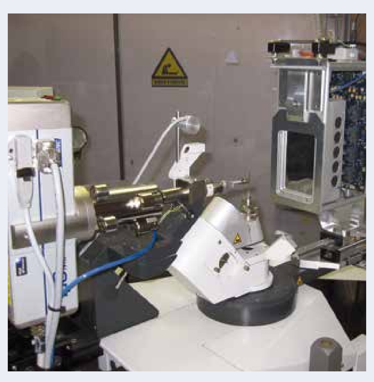


Adaptation to UHV deposition chamber for in-situ GISAXS studies in Bratislava, Slovakia



HRXRD setup at synchrotron beamline (Petra III, DESY) in Hamburg, Germany

Combined XRF/XRD setup for painting analysis in Antwerp, Belgium

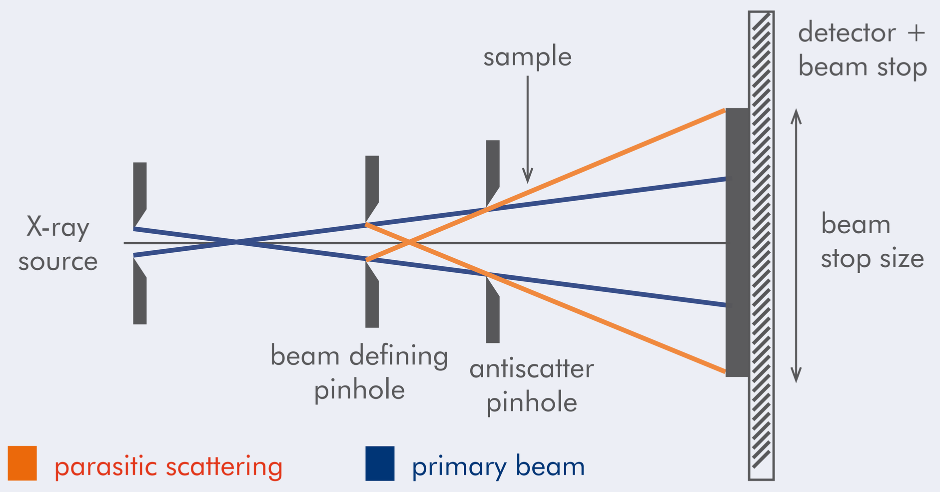


SCD setup for millisecond timing experiments w/ XPAD detector in Nancy, France

SCATEX - Scatterless Pinholes for Small Angle Scattering and X-ray Diffraction

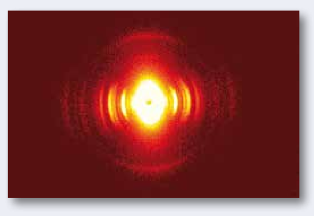
Main features

- strongly reduced parasitic pinhole scattering
- resolution and photon flux enhancement
- easier and faster pinhole alignment
- no antiscatter pinhole needed
- diameters 30-2000 µm
- SCATEX-Ge for lower and SCATEX-Ta for higher energies



A SAXS setup with a typical 3-pinhole collimation system. This illustration clearly shows that even with an antiscatter pinhole the beam stop needs a large diameter due to the parasitic scattering. With SCATEX pinholes the antiscatter pinhole becomes dispensable and the beam stop only needs to have the size of the primary beam. This enables a higher resolution and photon flux.

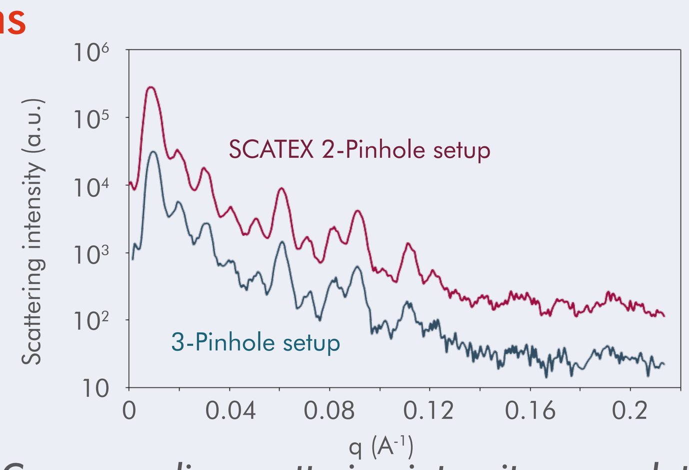
SCATEX Pinholes for SAXS Home-Lab Systems



SAXS scattering pattern of a rat tail tendon.

Advantages of a SCATEX 2-pinhole setup

- approx. 6 times higher scattering intensity with similar resolution
- higher flux possible due to a larger possible beam defining pinhole
- smaller footprint due to less pinholes
- faster data acquisition possible

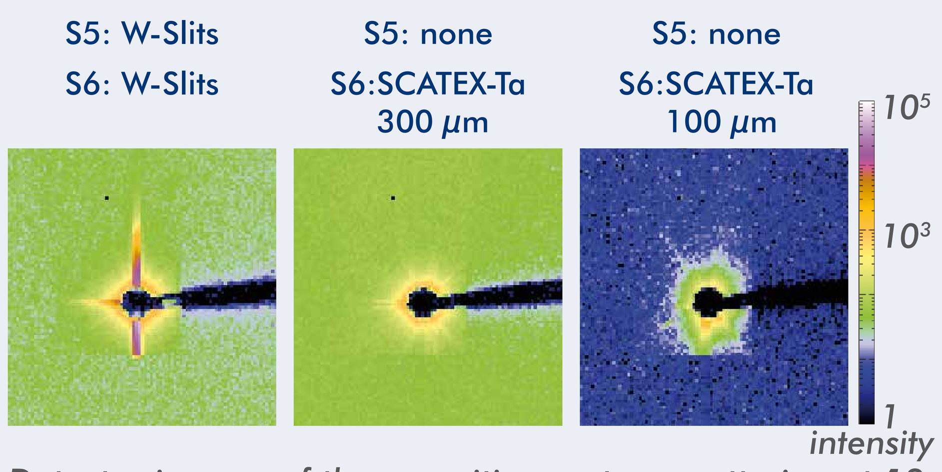


Corresponding scattering intensity vs. q-plot measured with a 3-pinhole high resolution NANOSTAR and with a modified 2-pinhole NANOSTAR equipped with SCATEX pinholes.

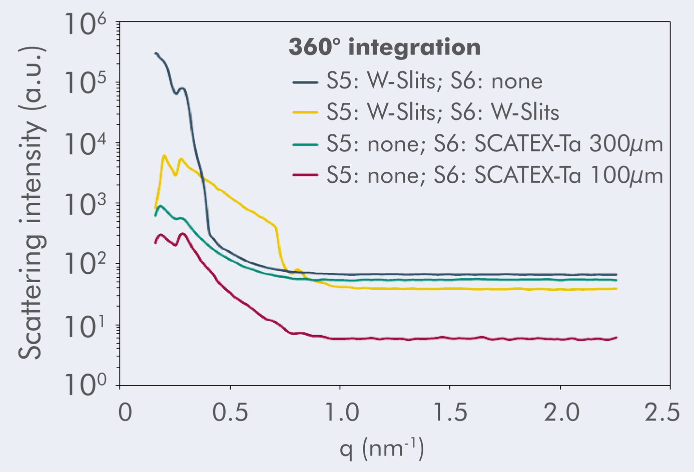
SCATEX Pinholes for Synchrotrons

▷Comparison of Tungsten Slits and SCATEX-Ta Pinholes

The measurements were performed at 13 keV at the Nanofocus Endstation P03 beamline at PETRA III with typical photon fluxes of 10^{11}-10^{12} ph/s.



Detector images of the parasitic aperture scattering at 13 keV. In the standard beamline setup S5 denotes the position of the beam defining aperture and S6 the position of the antiscatter aperture.

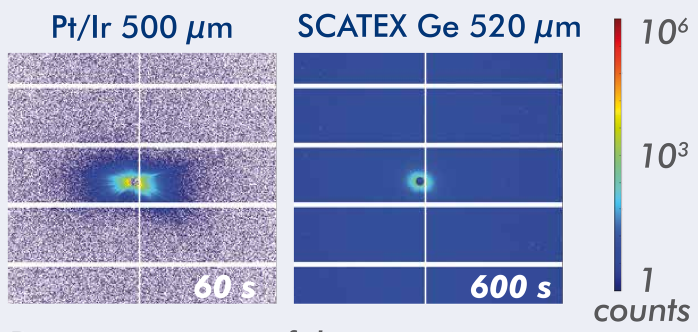


Scattering intensity vs. q-plot. The data is normalized to the number of summed up pixel. Various apertures were tested at position S5 (beam definition) and S6 (scatter guard).

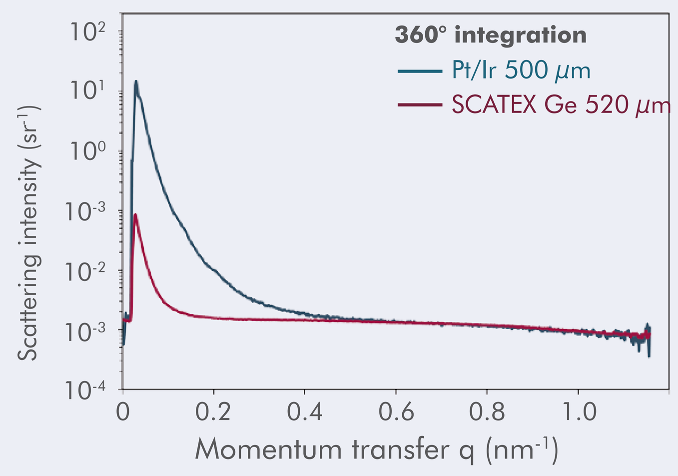
- a single SCATEX-Ta pinhole replaces both beam defining slit S5 and antiscatter slit S6
- the beam-defining SCATEX-Ta aperture can be positioned closer to the sample
- one order of magnitude less parasitic aperture scattering with SCATEX pinholes

▷Comparison of SCATEX-Ge with Conventional Pinholes and Scatterless Ge Slits

The corresponding measurements were performed at the PTB four-crystal monochromator beamline at BESSY II with a typical photon flux in the range of $4\cdot10^9$-$4\cdot10^{10}$ ph/s. The tested apertures were aligned centric into the primary beam.



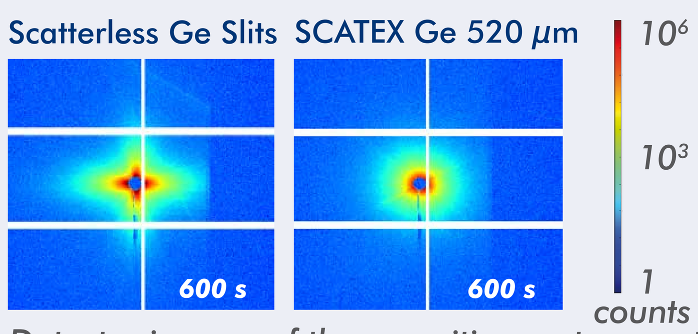
Detector images of the parasitic aperture scattering at 8 keV.



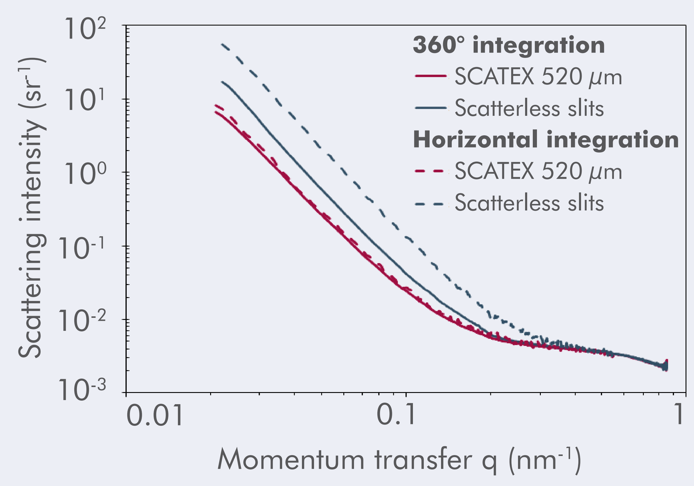
Scattering intensity deduced from the detector images and corrected for the different measurement times and normalized to the photon flux upstream of the tested aperture.

SCATEX-Ge pinholes

- 2 orders of magnitude less parasitic scattering
- much less scattering into the q-space
- scattering pattern is circular, thus showing the high overall structural quality of the pinhole



Detector images of the parasitic aperture scattering at 8 keV of scatterless Ge slits and of a SCATEX pinhole made of Ge.



Scattering intensity vs. q-plot. The data is normalized to the photon flux downstream of the test aperture and to the solid angle.

SCATEX-Ge pinholes

- up to 8 times less parasitic aperture scattering
- higher data quality and faster data acquisition

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