SCATEX

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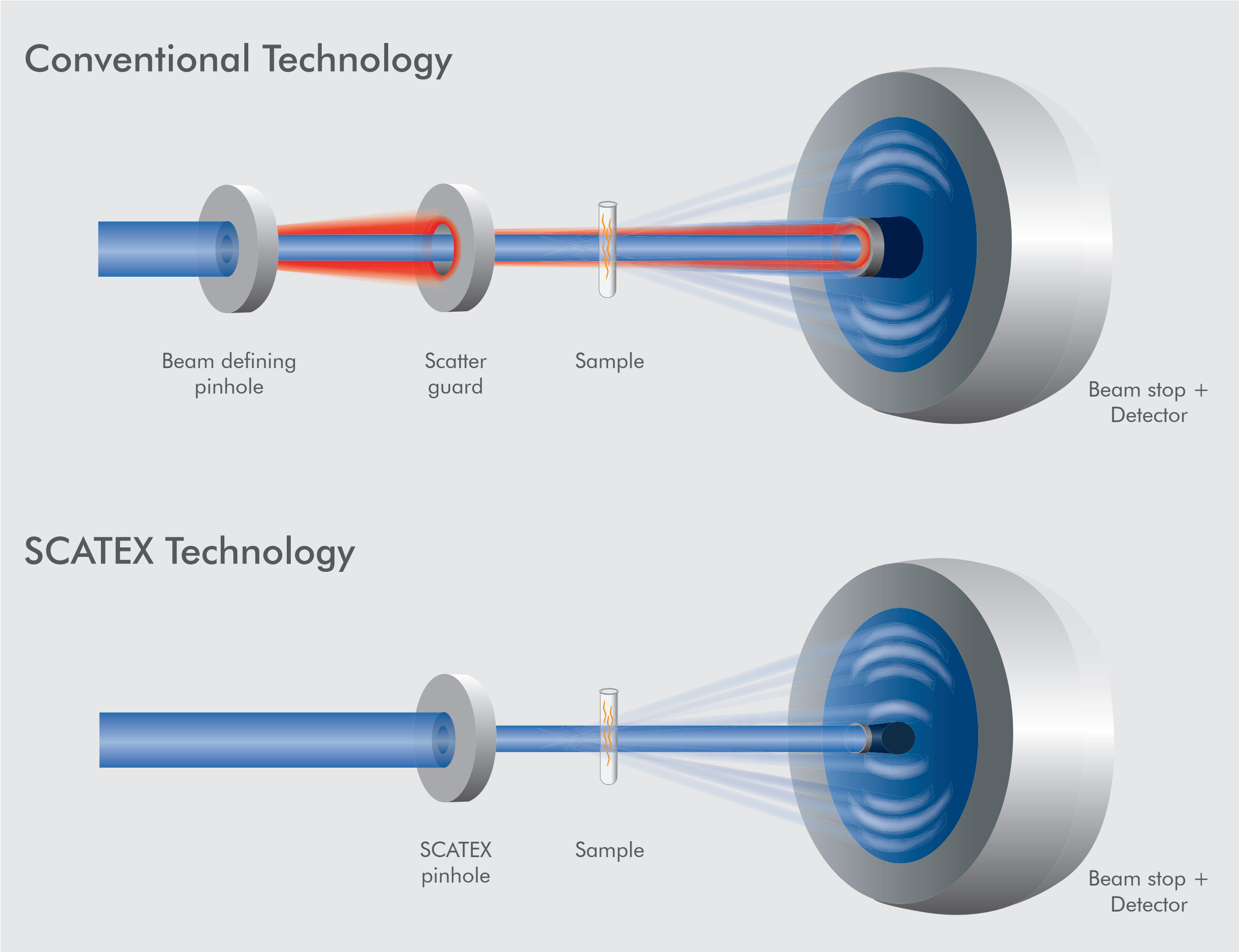
# SCATEX

## Scatterless pinholes for home-lab systems




Parasitic scattering caused by apertures is a well-known problem in X-ray analytics, which forces users and manufacturers to adapt their experimental setups to this unwanted phenomenon. Increased measurement times due to lower photon fluxes, a lower resolution caused by an enlarged beam stop, a larger beam defining pinhole-to-sample distance due to the integration of a scatter guard and generally a lower signal-to-noise ratio lead to a loss in data quality.

### Main SCATEX features:

- Germanium pinholes for lower and Tantalum pinholes for higher photon energies
- available sizes: 20-2000 $\mu$m

### Your benefits:

- strongly reduced parasitic aperture scattering
- resolution and photon flux enhancement
- easier and faster pinhole alignment
- no scatter guard needed
- system size shrinks
- data quality improves

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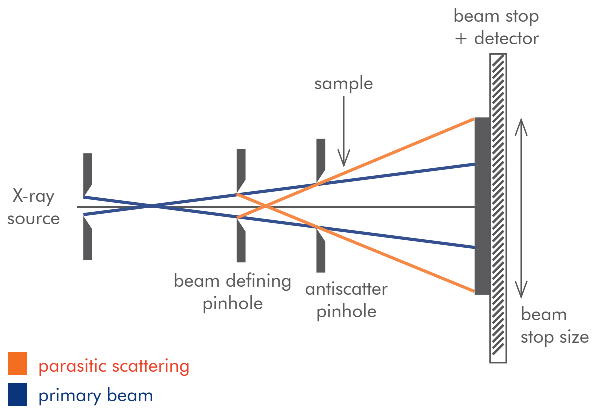
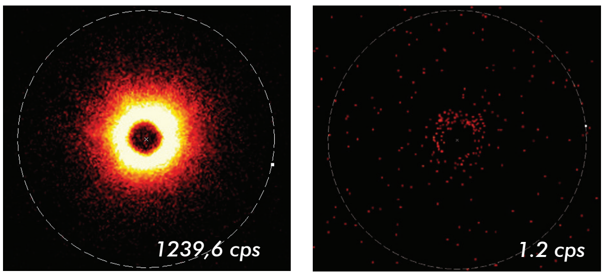
Typical SAXS instruments in home-laboratories have a 3-pinhole collimation system. The first two pinholes define the beam size and its divergence. The third pinhole acts as a scatter guard to absorb parasitic aperture scattering as illustrated in the figure below.




*SAXS setup with a typical 3-pinhole collimation system. The illustration clearly shows that even with an antiscatter pinhole the beam stop needs a large diameter due to the parasitic aperture scattering. Using SCATEX pinholes instead, the scatter guard becomes dispensable and the minimum beam stop diameter decreases. Thus, SCATEX pinholes enable a higher resolution and photon flux.*

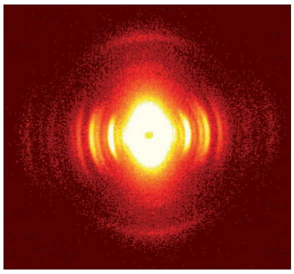
In contrast, SCATEX pinholes have a high potential for home-laboratory SAXS setups as they improve the performance regarding the photon flux and resolution while simultaneously shrinking the length of the primary beam path. The unique property of SCATEX pinholes to strongly suppress parasitic aperture scattering is shown in the comparative measurement below.



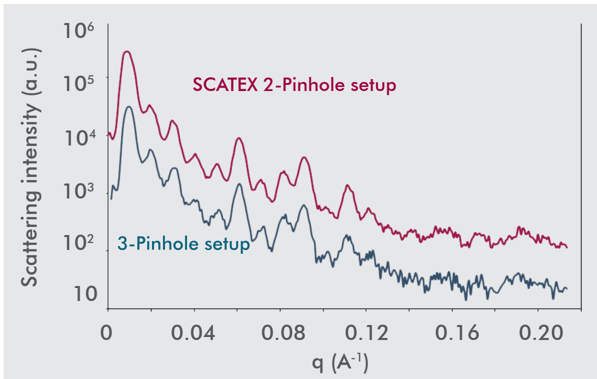

*Comparison of a conventional Pt/Ir pinhole and a SCATEX-Ge pinhole, both with 300 μm diameter. Measurement time: 100 s.*

Two apertures of the same size (300 μm), namely a commercially available Pt/Ir pinhole and a SCATEX pinhole made of Germanium, are compared in the same 2-pinhole SAXS setup with no scatter guard installed. The tested apertures are aligned centrically in the primary beam and act as the beam defining pinhole. The corresponding detector images show that with SCATEX pinholes the region around the beam stop is almost dark (1.2 cps), whereas the Pt/Ir pinhole causes a three orders of magnitude higher parasitic aperture scattering signal (1239.6 cps). This corresponds to a bright corona around the beam stop which overlaps with valuable measurement data.

The following results show how SCATEX pinholes can significantly improve SAXS setups by removing the scatter guard and simultaneously enlarging the beam defining pinhole size.



*SAXS image of a rat tail tendon.*




*Scattering intensity of a rat tail tendon measured with a 3-pinhole high-resolution NANOSTAR™ and a modified 2-pinhole NANOSTAR™ equipped with SCATEX pinholes. The resolution of both setups is very similar, but the setup with SCATEX pinholes gives a significantly higher scattering intensity.*

These comparative SAXS measurements on a rat tail tendon have been performed with a conventional 3-pinhole high-resolution NANOSTAR™ of Bruker AXS and an improved 2-pinhole NANOSTAR™ equipped with SCATEX pinholes. The I(q)-plot shows that both setups have a very similar resolution but the 2-SCATEX-pinhole setup has a significantly higher scattering intensity. Consequently, data of the same quality can be collected much faster by using only two SCATEX pinholes instead of three conventional pinholes.