

GENERATING HIGH BRILLIANCE X-RAY BEAMS FOR X-RAY DIFFRACTION AND SCATTERING APPLICATIONS



Reflecting Future Technology

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XENOCS supplies :

- innovative x-ray multilayer optics
- X-ray beam delivery solutions

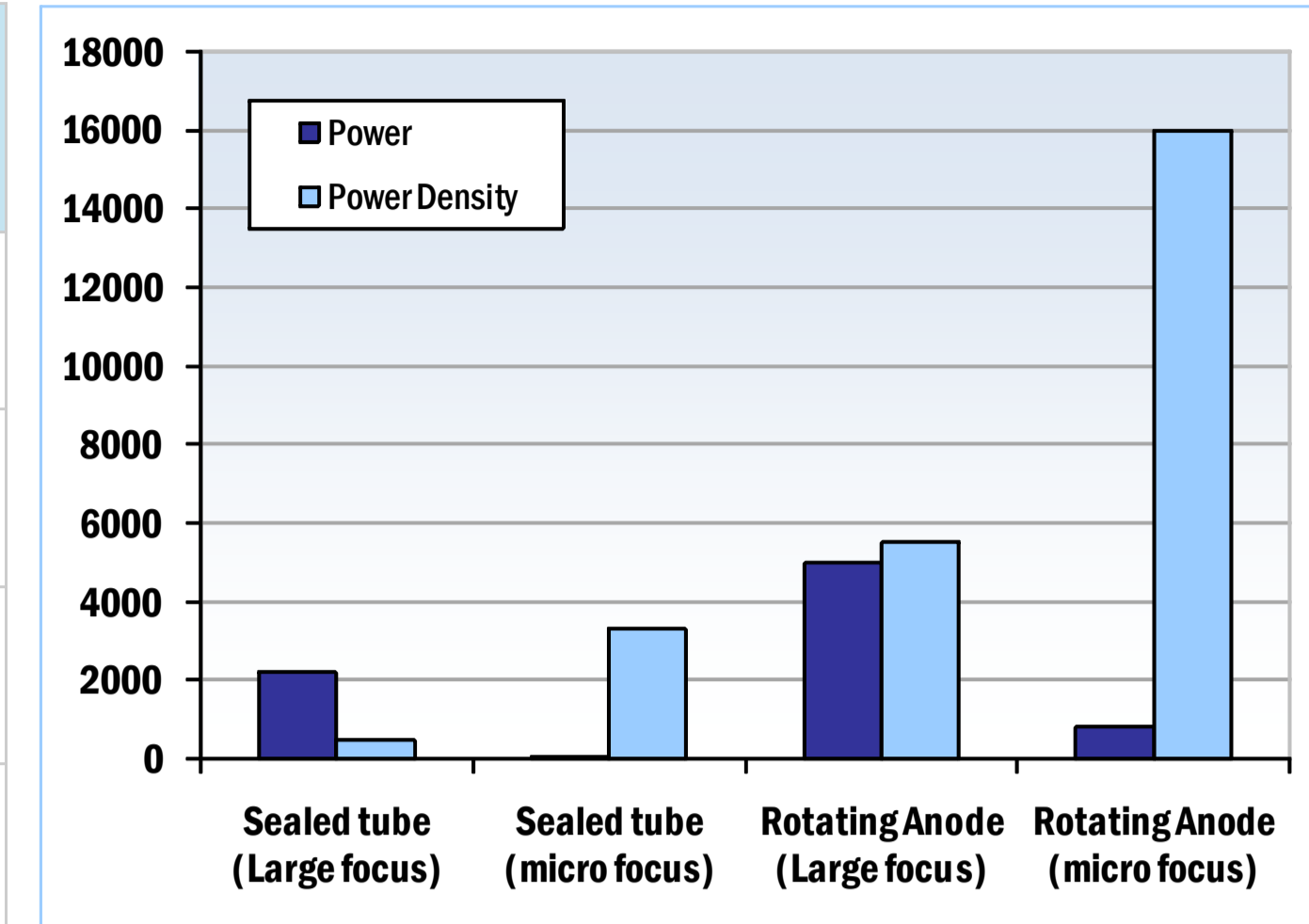


Applications presently covered :

- Protein Crystallography
- Small Molecule
- SAXS
- High Resolution
- High pressure diffraction
- Powder diffraction
- And many others ...

Performance ~ Brilliance (power versus power density)

X-ray Generator Type	Power (W)	e-beam spot (mm ²)	Power Density (W/mm ²)
Sealed tube (large focus)	2200	12 x 0.4	460
Sealed tube (micro focus)	50	0.3 x 0.05	3330
Rotating anode (large focus)	5000	3 x 0.3	5500
Rotating anode (micro focus)	800	0.7 x 0.07	16000



◆ Microfocus sources provide very high brilliance at low power

Measurement:

- Small areas
- Mapping capability
- High resolution
- Short time

Beam distribution in:

- Real space
- Angular space
- Wave-length or energy
- Time

Beam generation:

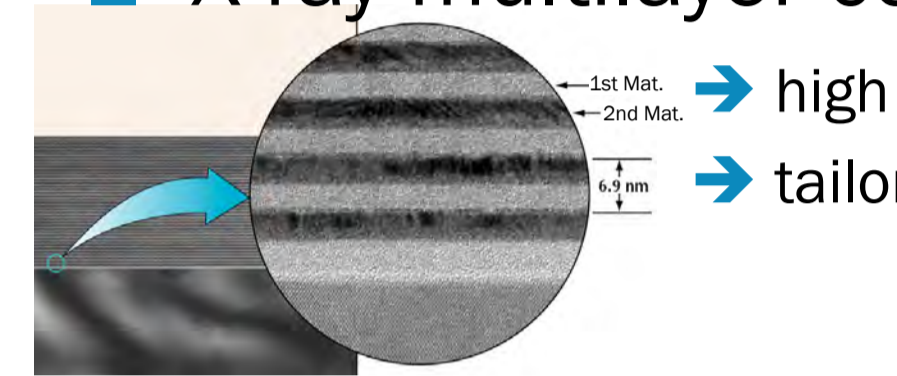
- Source brilliance
- Optics efficiency
- Beampath

Brilliance: Ph/mm²/mrad²/s in relevant part of spectrum

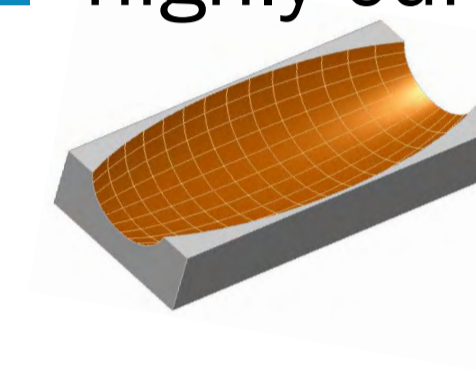
- Brilliance starts with the [source](#).
- At best, [optics](#), beam path preserves brilliance while transforming beam to a useful (optimum) distribution in phase-space.

Aspheric Multilayer Coated Optics (AMCO)

- X-ray multilayer coatings
- highly curved aspheric substrates

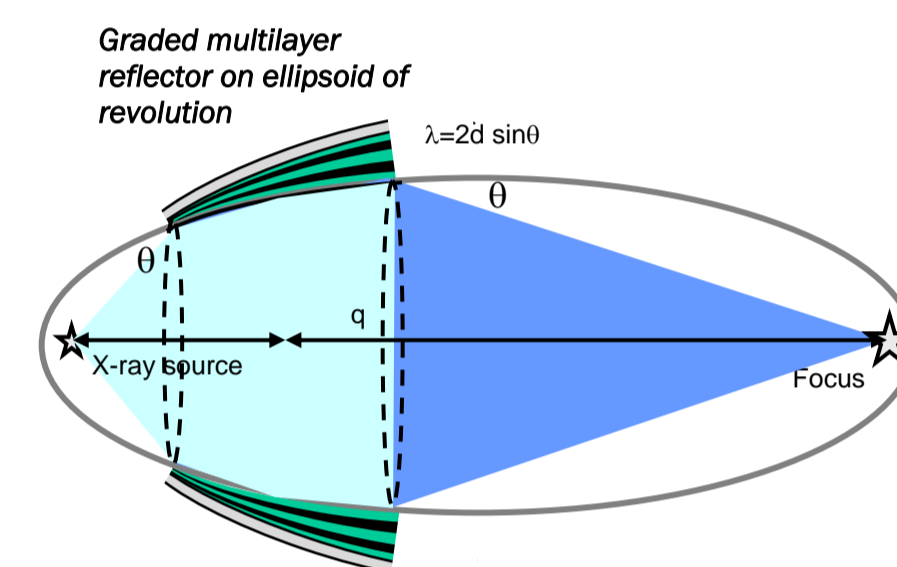


- high reflectivity
- tailored spectral purity



- large collection angles
- spot size

Advanced X-ray optics

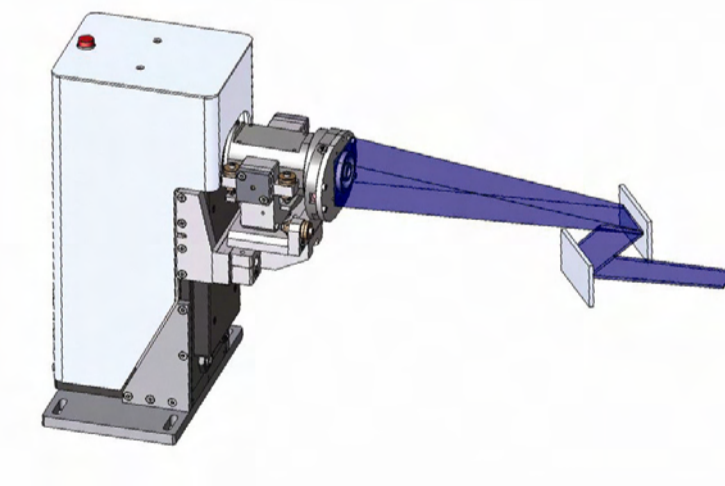
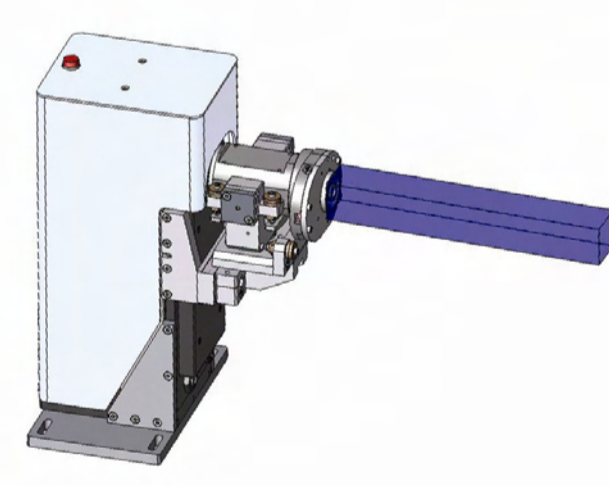
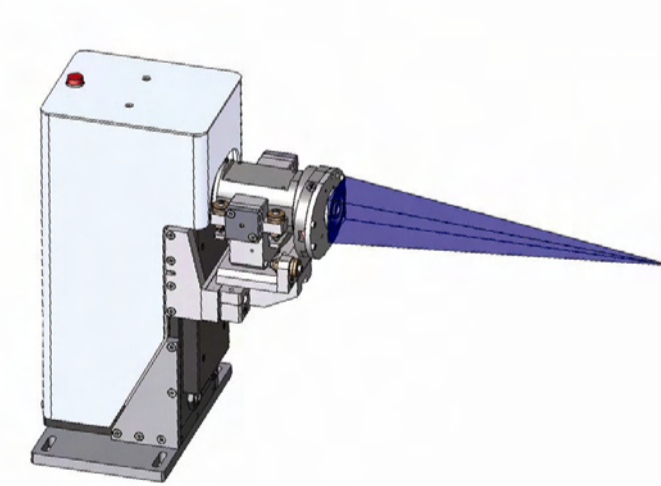


AMCO preserve source brilliance

- high efficiency/reflectivity
- high stability
- easy to align
- larger collection angle
- no time degradation

GeniX configurations

	Applications	Typical Flux _{vac}	Spot _{focus} (FWHM/μm ²)	Divergence
GeniX CU VHF	Proteomics	310 Mph/s	200 x 200	5.4 x 5.4 mrad ²
GeniX CU High Flux	Proteomics	230 Mph/s	230 x 230	4.7 x 5.2 mrad ²
GeniX CU Low Divergence	SAXS, High Resolution	150 Mph/s	1500 x 1500	0.8 x 0.8 mrad ²
GeniX CU High Convergence	Thin Film Metrology	>400 Mph/s	80 x 80	4 x 2 deg ²
GeniX MO High Flux	Small Molecule	20 Mph/s	200 x 200	3 x 3 mrad ²
GeniX MO Small Spot	High Pressure	5 Mph/s	80 x 80	4 x 4 mrad ²



- Focusing / focusing
- Collimating / collimating
- Focusing / collimating

Features

- Micro-focus Source (50W)
- High performance optics
- Compact system
- Collimation system
- Control & Command unit
- Safety & Fast Shutters
- Remote Operation (Ethernet)
- Water cooling (closed loop)
- Rack mounted chiller

Benefits

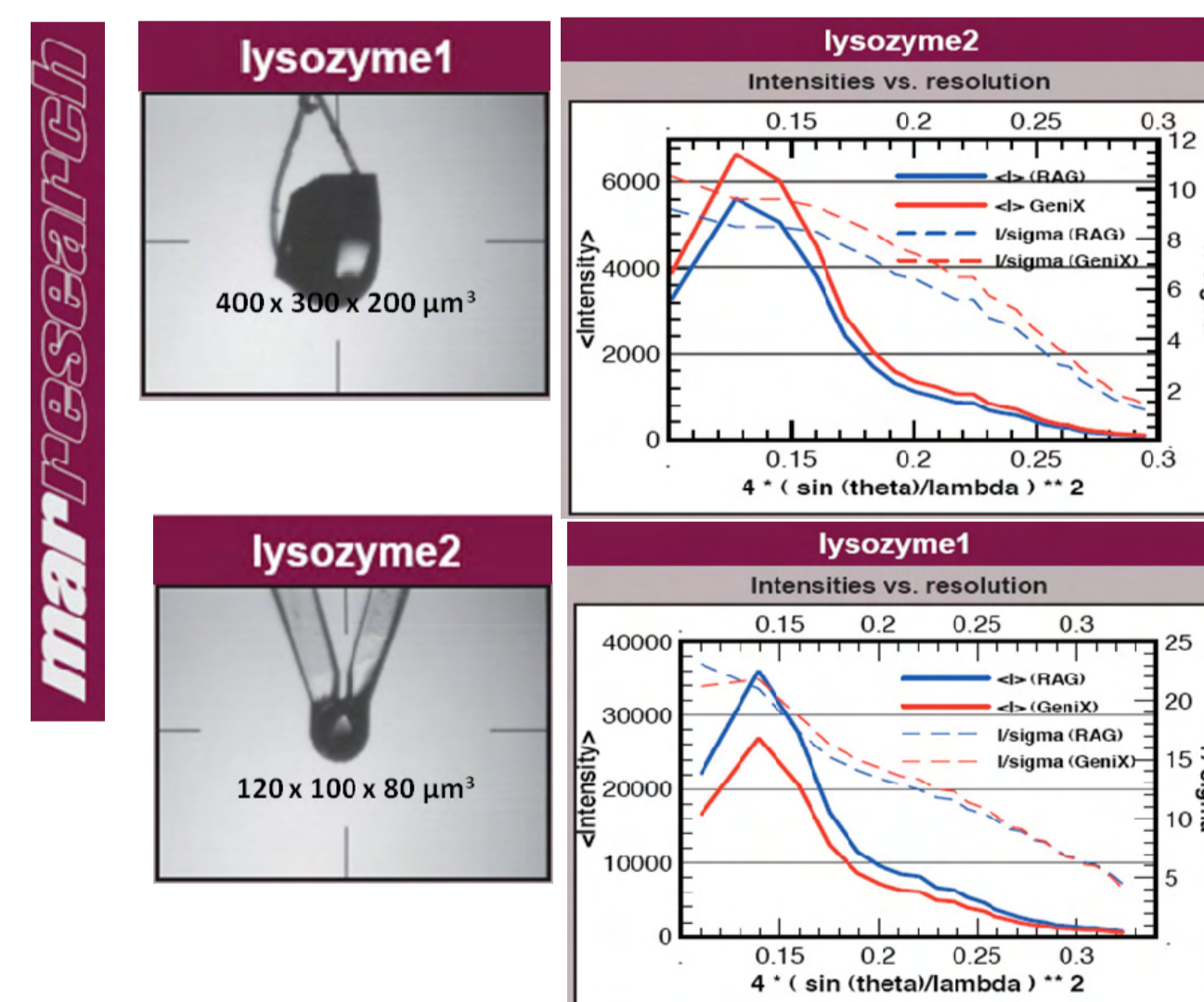
- High brilliance
- Extreme beam stability
- Easy to integrate
- Ease of Alignment
- Ease of Use
- Space clearance from sample
- Low power consumption
- Low maintenance
- Limited Floor Space requirements



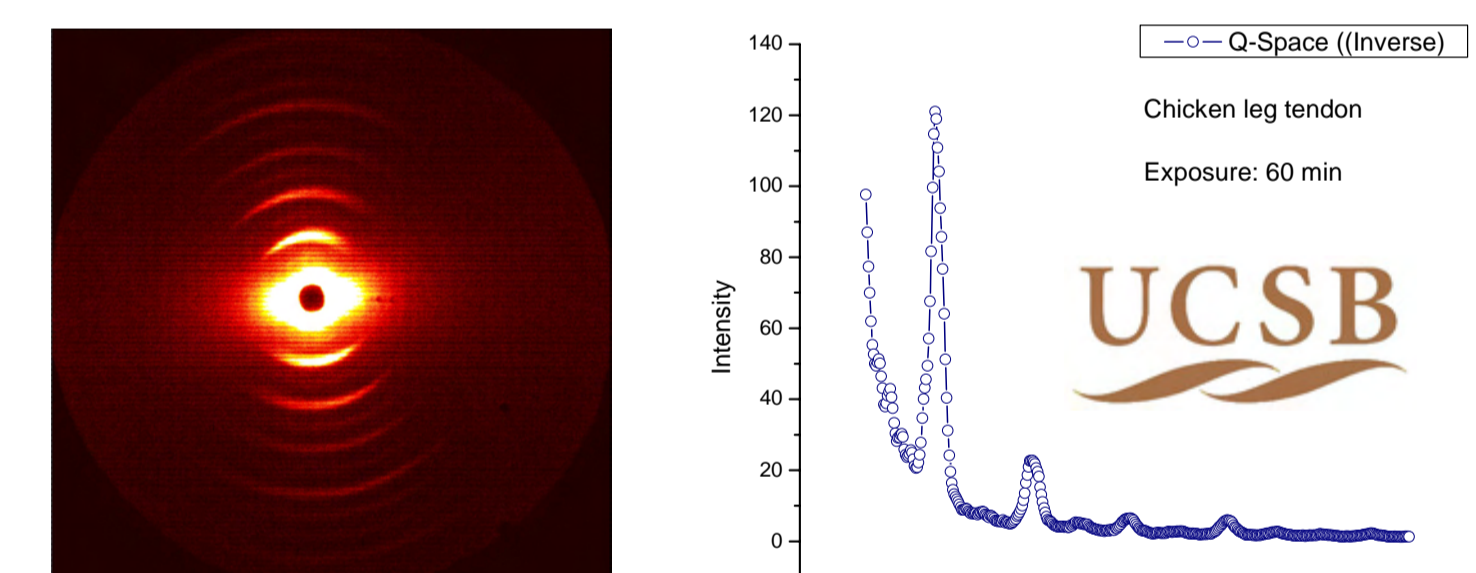
GeniX CU High Flux

Protein crystallography

2 kW RAG (200 μm) versus GeniX CU High Flux (50W)



GeniX CU Low Divergence



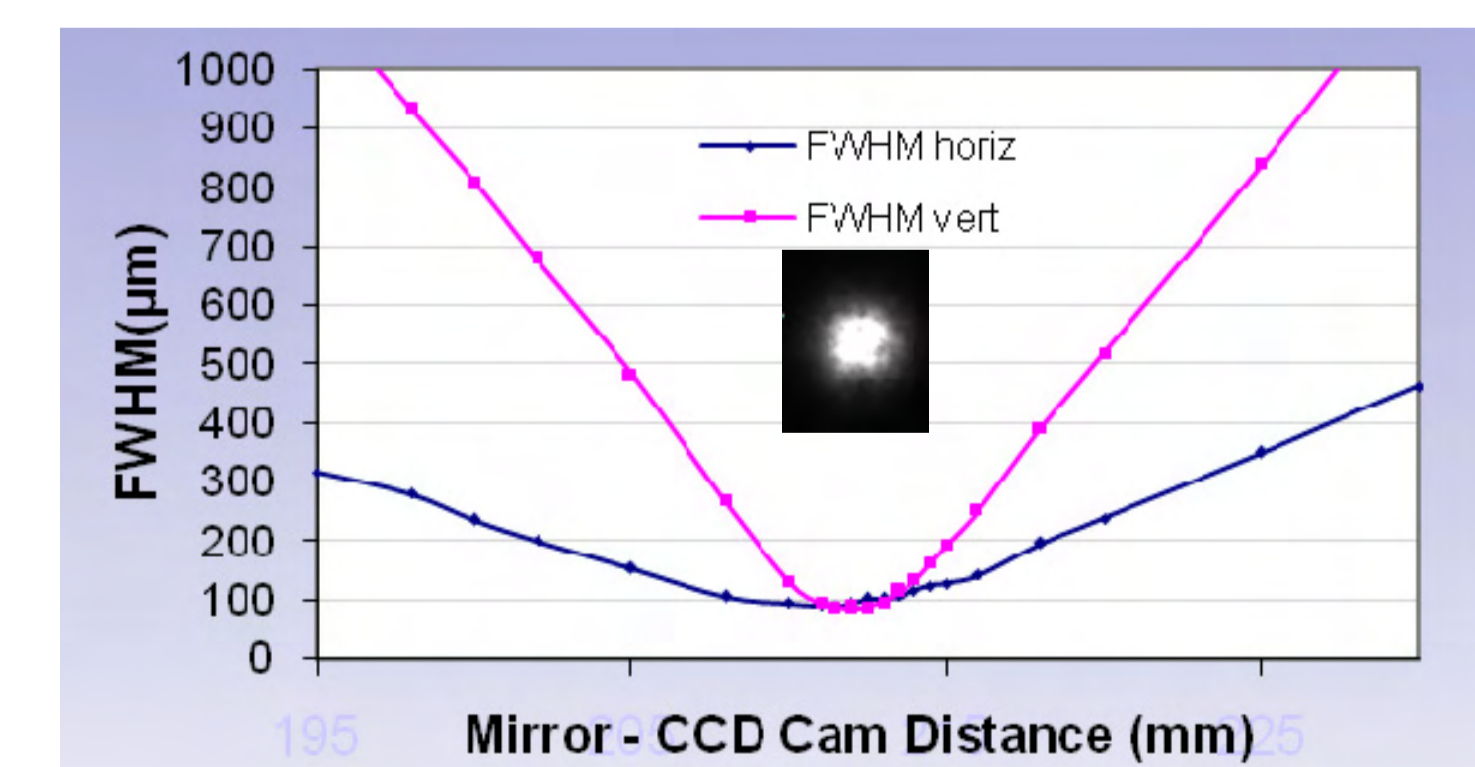
SAXS data collected with GeniX-powered SAXS system from a hydrated chicken leg tendon sample.

Key parameters of SAXS setup with GeniX

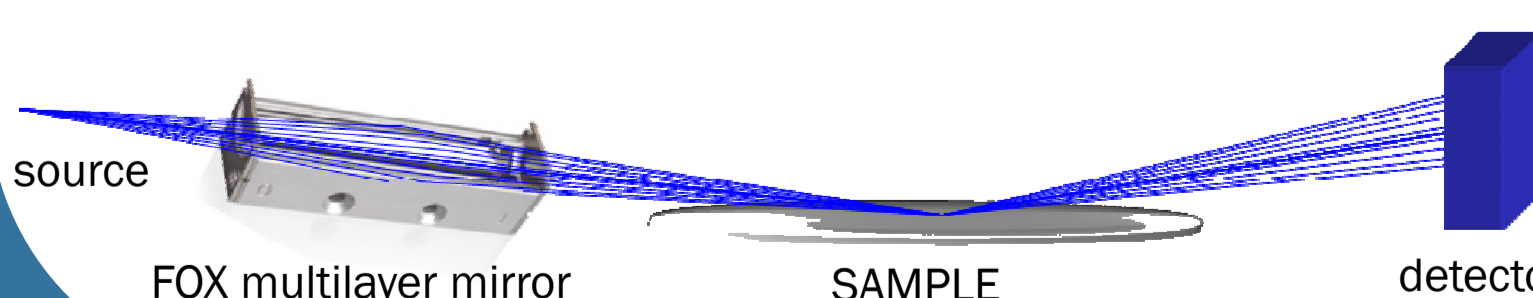
Source-to-Sample Distance	1.8 meters
Sample-to-Detector Distance	1.7 meters
Detector	Bruker HI-STAR multiwire
Beam Collimation	3 sets of motorized slits
Qmin*	1.0x10 ⁻² Å ⁻¹
Beam Flux at sample*	1.4 x 10 ⁷ ph/s

* Note that a lower Qmin and higher flux can be obtained with further system optimisation.

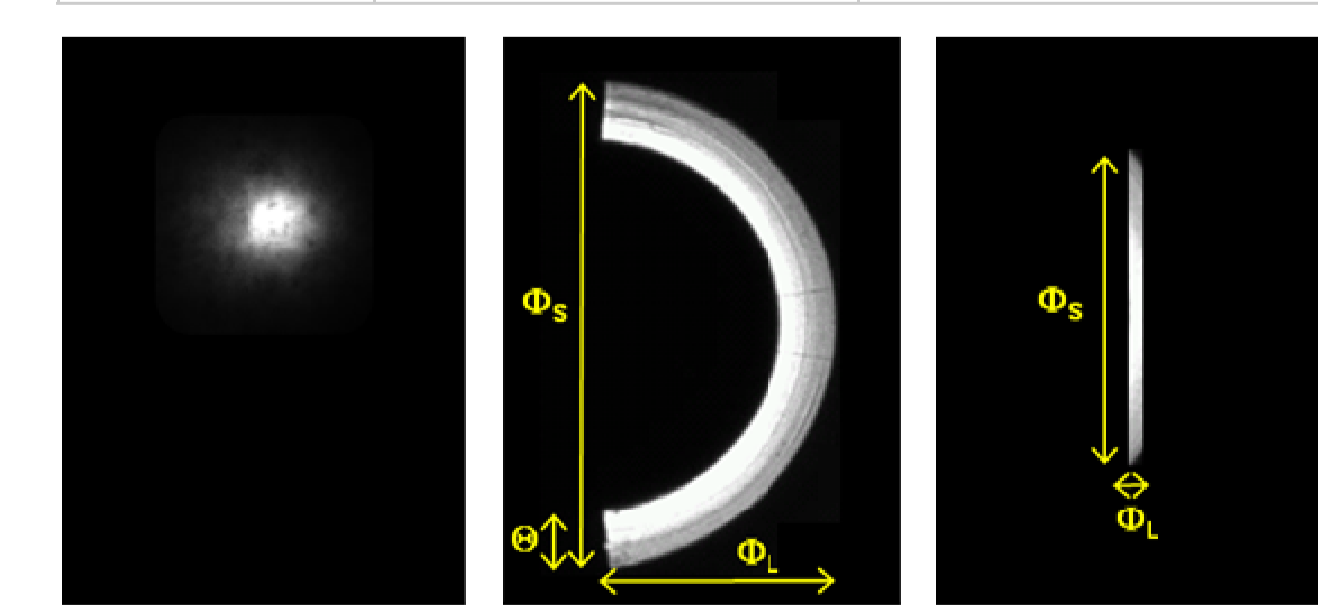
GeniX CU High Convergence



Focusing curves & CCD image of beam profile at focus (inset)



Beam configuration	Slit-limited Beam (customizable)	Full Beam
Typical flux	> 26 x 10 ⁶ ph/s	> 440 x 10 ⁶ ph/s
Beam convergence	ΦS = 2.6 deg ΦL = 0.05 deg	ΦS ≥ 4 deg ΦL ≥ 2 deg Θ = 0.54 deg
Spot size at focus FWHM	~80 μm	~80 μm



- is a stable, high brilliance, low power microfocus beam delivery system.
- is proven to outperform standard sealed tubes and to provide performance equivalent to traditional rotating anode generator in a number of applications.
- is an affordable solution metrology with reduced maintenance, facilities requirements and running cost.
- is validated by a number of equipment makers and academics

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