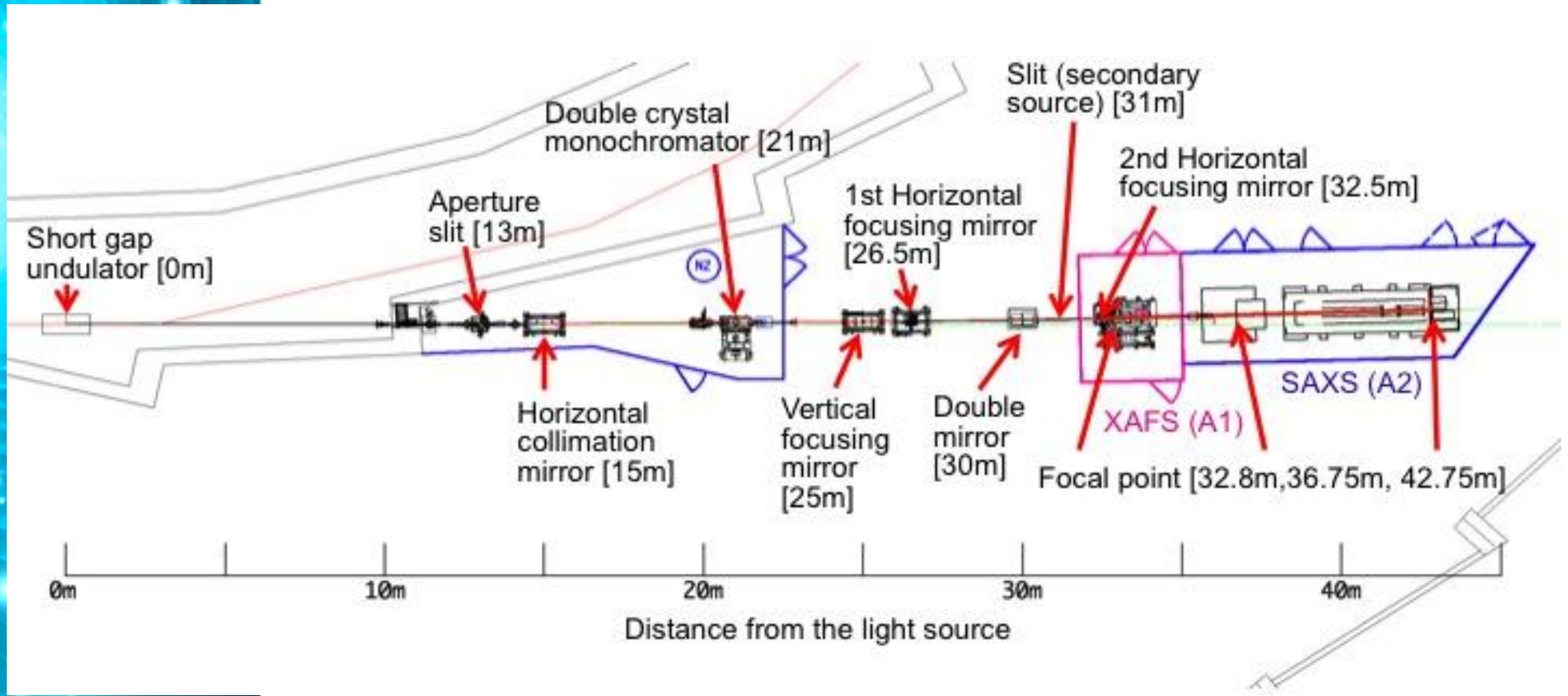
SAXS stations in SR centers

SAXS stations :

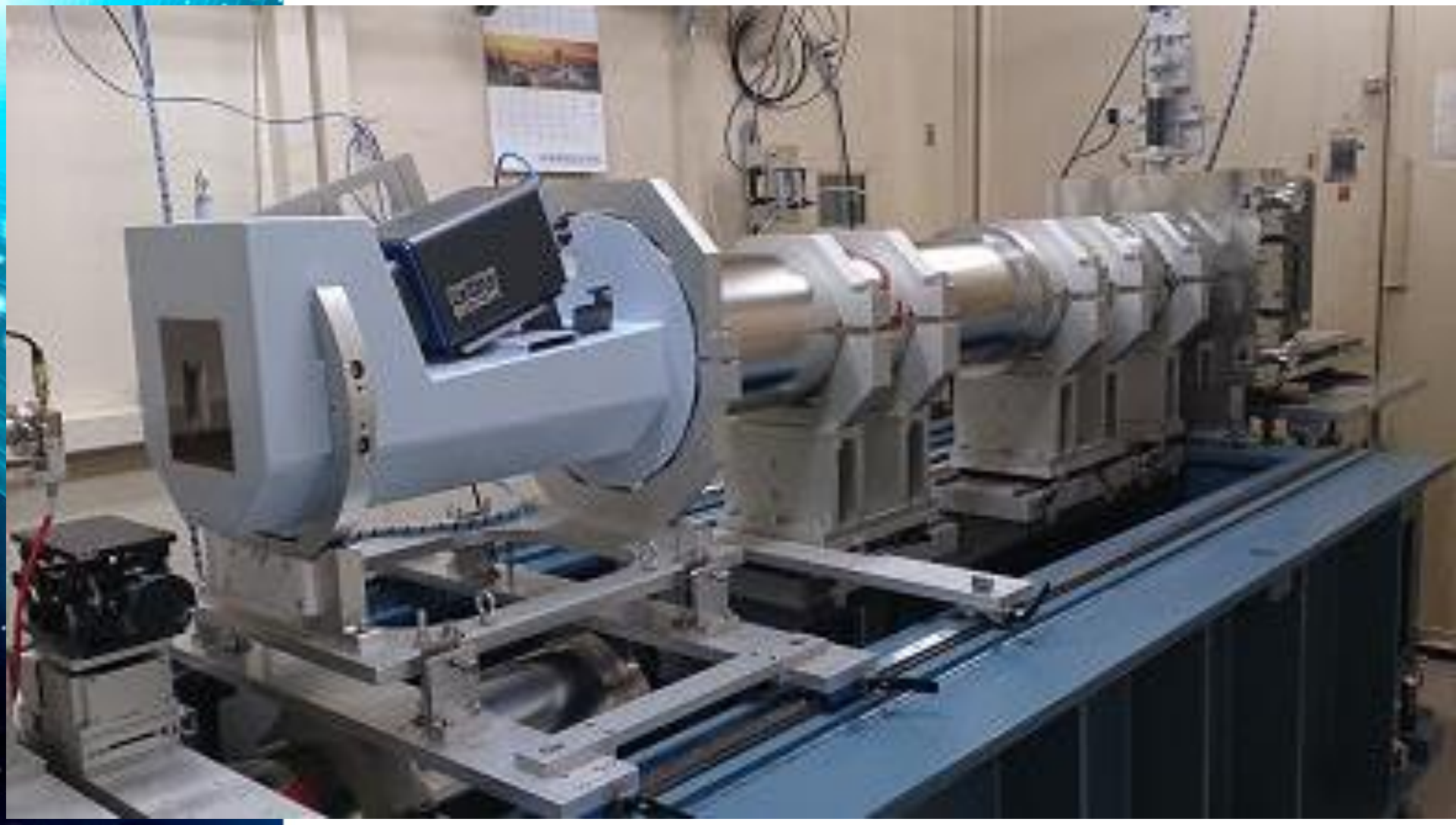
ESRF, Stanford SRL, KEK

- Scheme
- Source
- Beam parameters
- Used detectors
- Problems

KEK BL15 – SAXS/GISAXS



KEK BL15 – SAXS/GISAXS



KEK BL15 – SAXS/GISAXS

Light Source: Short Gap Undulator

Energy range : 2.1 - 15 keV
Energy resolution : 2 x 10^{-4}
Beam Flux : >10^{11} phs/s

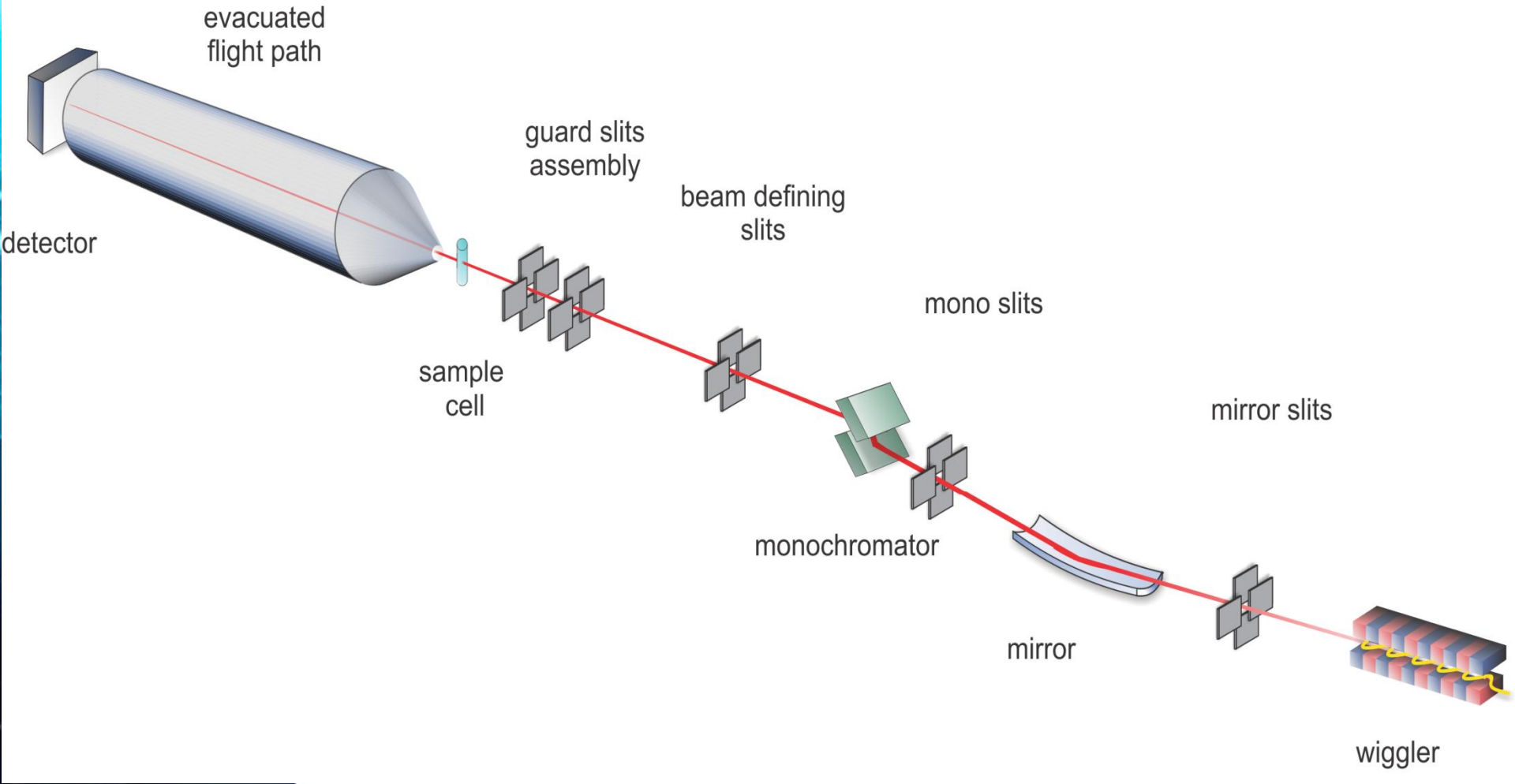
Beam size :

0.288(H)x0.035(V) mm (GISAXS)
0.663(H)x0.040(V) mm (SAXS/WAXS)

SAXS Detector : Vacuum-compatible PILATUS3 2M
WAXS Detector : PILATUS3 300KW

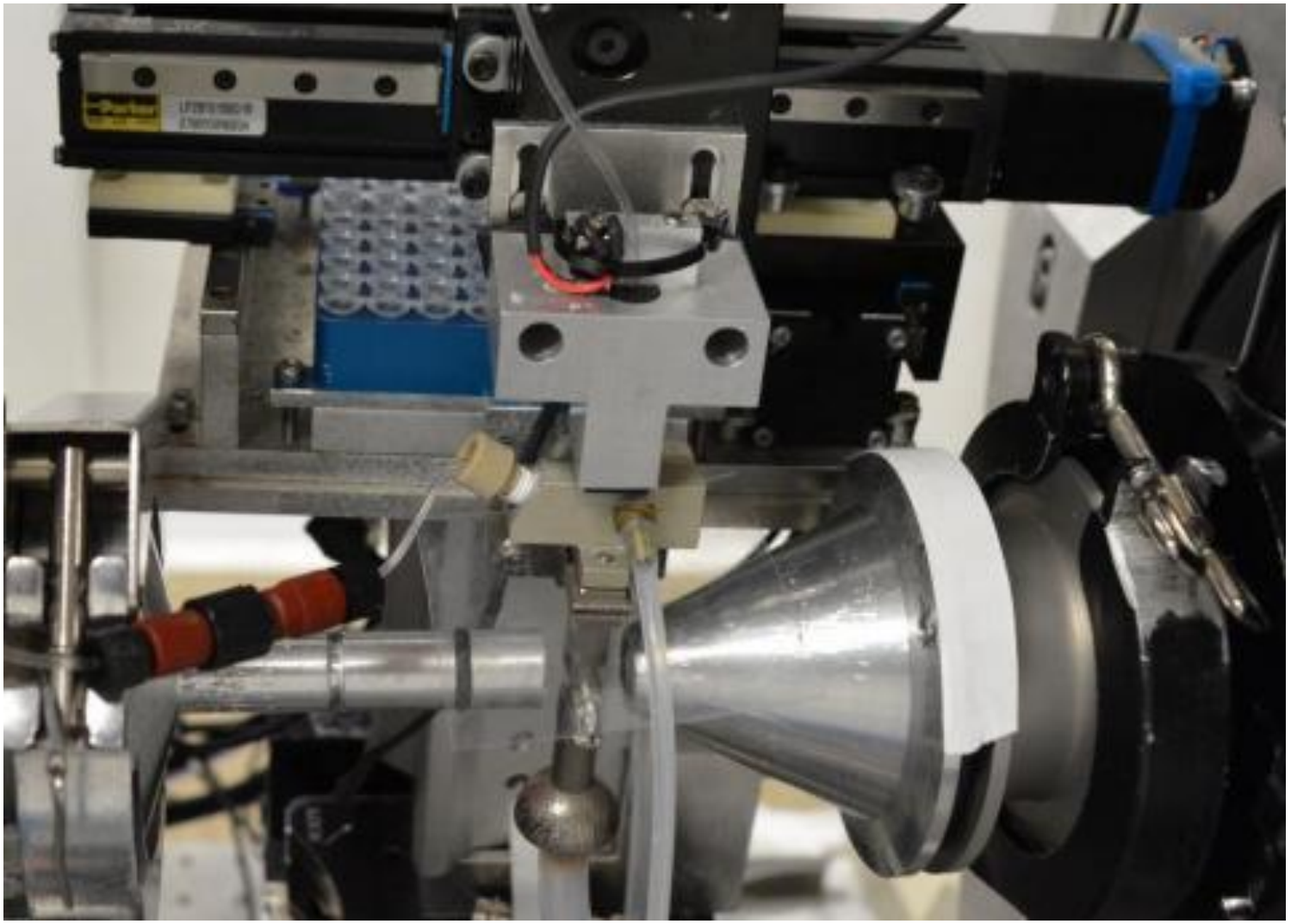
Problems :
structural studies of functional membranes
large hierarchical structure analysis
structure determination of biological system
etc.

Stanford SRL: BL-4-2 SAXS



SSRL: BL-4-2 SAXS beamline

Sample environment



SSRL BL4-2 – SAXS

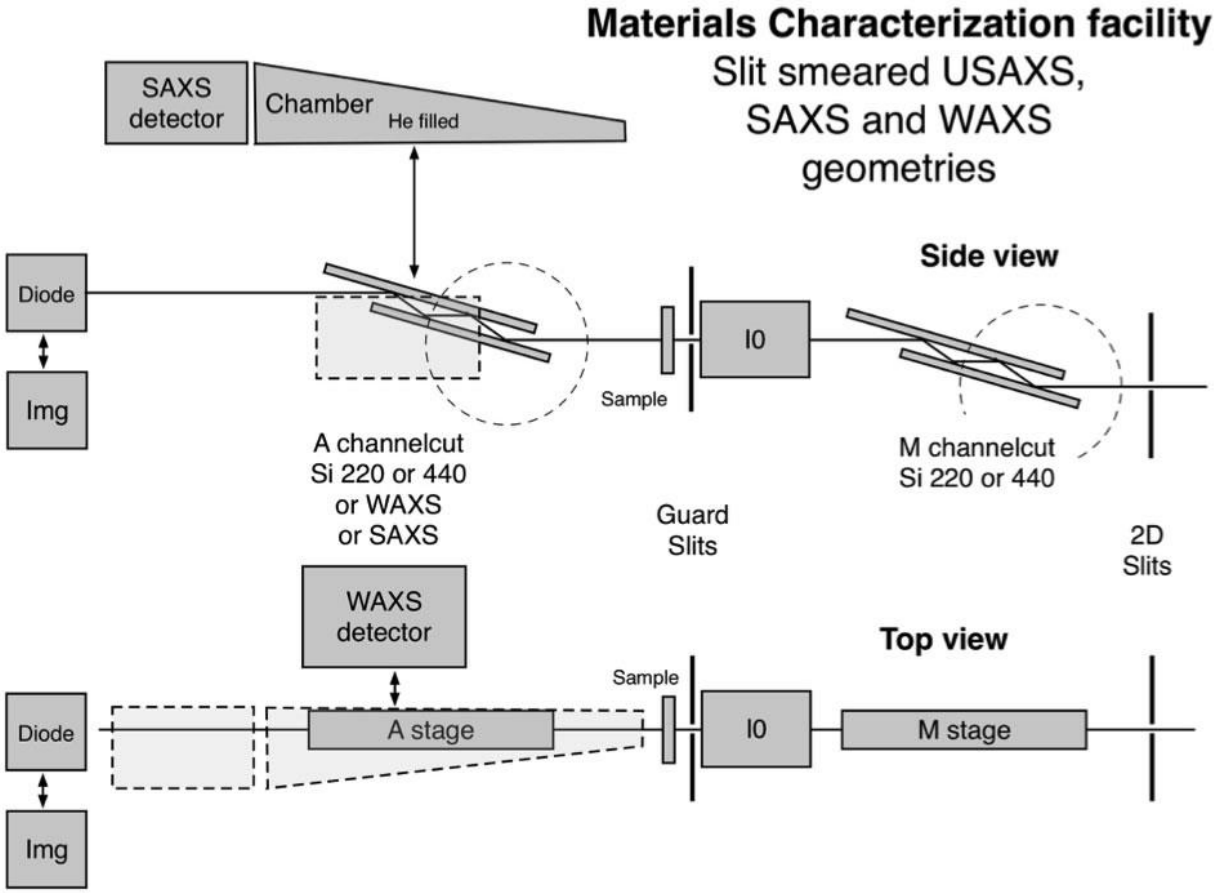
Light Source: wiggler

Energy range : 6 - 17 keV / 8 – 14 keV
Energy resolution : $5 * 10^{-4}$ / $3 * 10^{-2}$
Beam Flux : $3*10^{12}$ phs/s / $1*10^{14}$ phs/s
Beam size : 0.2(H)*1.0(V) mm
Sample-detector distance: 0.25 – 3.5 m

Detectors : PILATUS3 1M, Rayonix MX225HE, Pilatus 300K

Problems :
structural biology and biophysics

APS 9ID USAXS/SAXS/WAXS



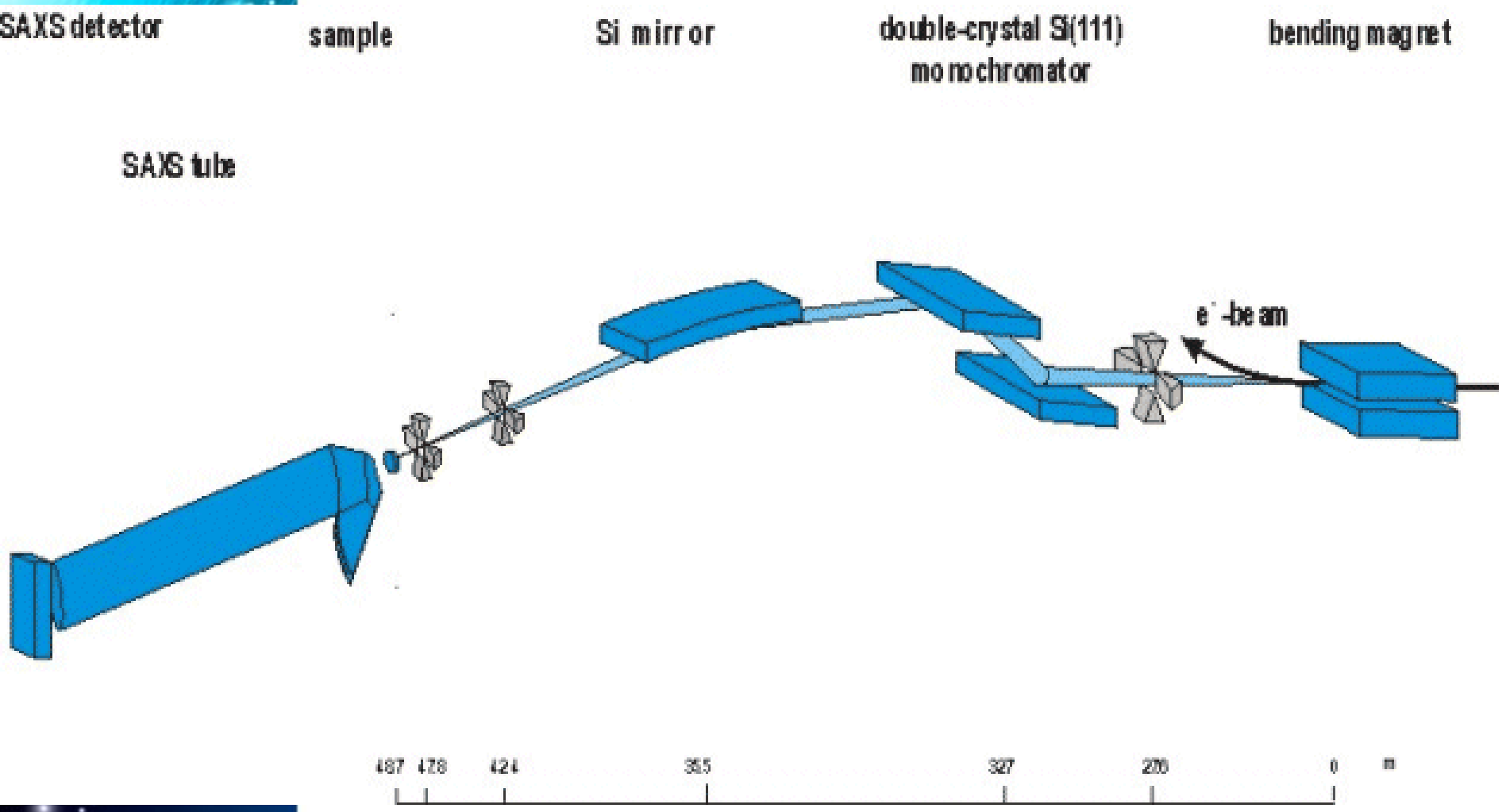
APS 9ID USAXS/SAXS/WAXS

Light Source: Undulator

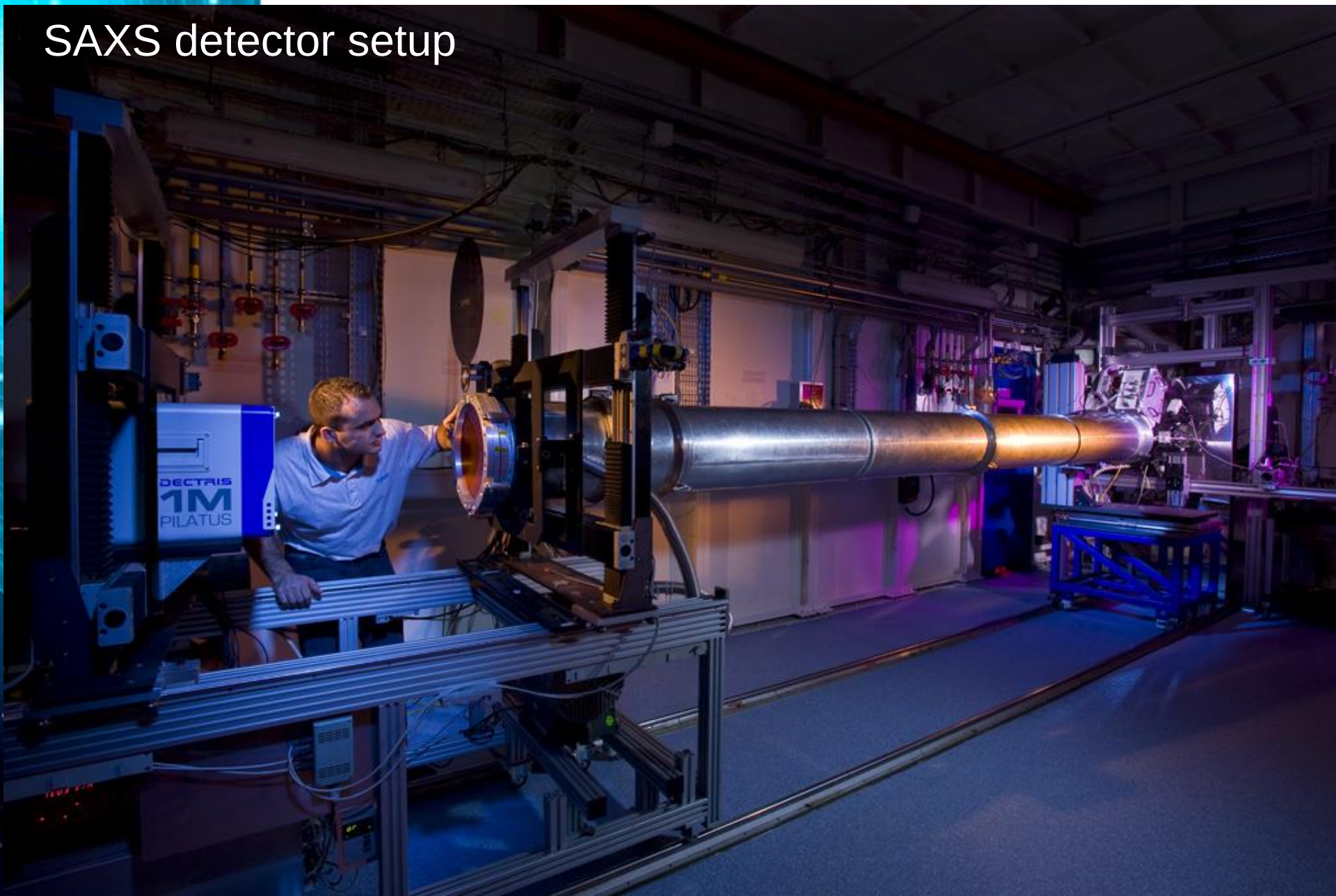
Energy range : 10 - 24 keV
Energy resolution : 1.5 x 10^{-4}

Problems :
In situ and *operando* measurement to investigate materials phenomena of technological importance

ESRF : BM26B – SAXS/WAXS



ESRF : BM26B – SAXS/WAXS



ESRF : BM26B – SAXS/WAXS

WAXS detector setup

ESRF : BM26B – SAXS/WAXS

Light Source: bending magnet

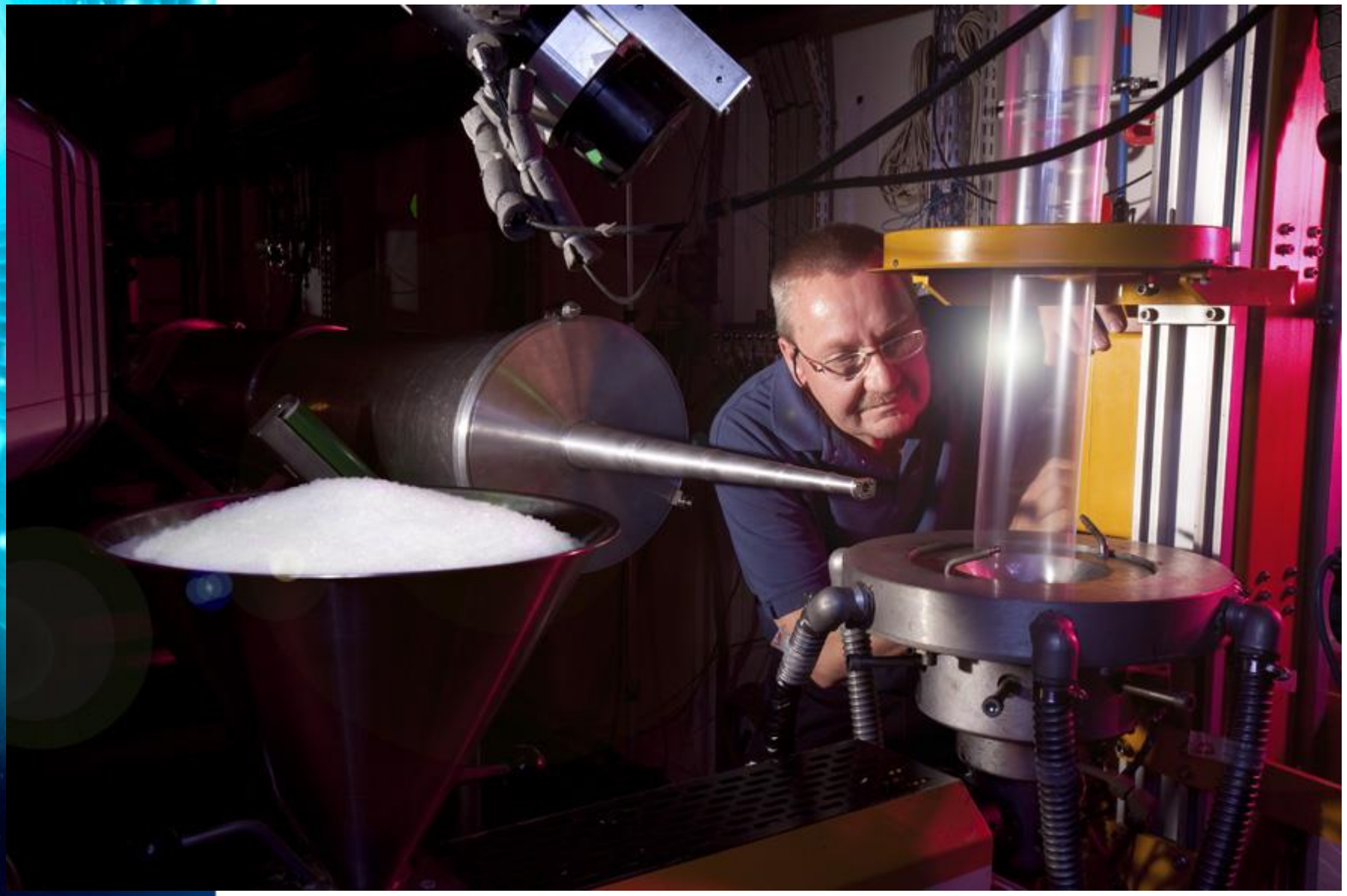
Energy range : 5 - 30 keV
Energy resolution : 5 x 10^{-4}
Beam Flux : >2*10^{11} phs/s
Beam size : 0.4(H)*0.35(V) mm
Sample-detector distance: 1.3 – 7 m

SAXS Detector : PILATUS3 1M,
WAXS Detector : PILATUS3 300K-W

Problems :
Largely devoted to soft condensed matter research.
In *situ* study in SAXS and WAXS at the same time

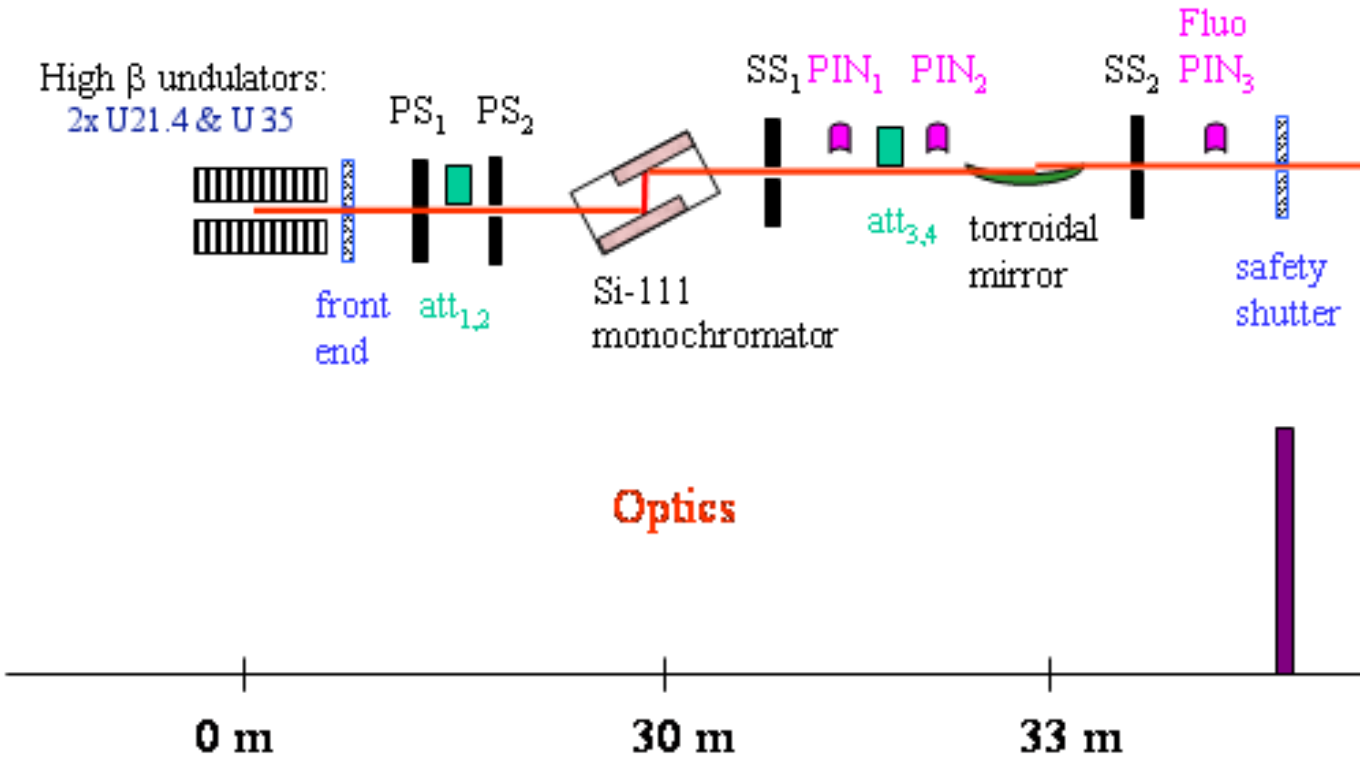
ESRF : BM26B – SAXS/WAXS

investigate the microstructure of LDPE films



ESRF : ID02 - TIME-RESOLVED ULTRA SMALL-ANGLE X-RAY SCATTERING

Optics hutch



ESRF : ID02 - TIME-RESOLVED ULTRA SMALL-ANGLE X-RAY SCATTERING

Experimental hutch

ESRF : ID02 - TIME-RESOLVED ULTRA SMALL-ANGLE X-RAY SCATTERING

Light Source: Undulator

Energy range : 8 - 25 keV
Energy resolution : 1.5×10^{-4}
Beam Flux : $>5*10^{13}$ phs/s
Beam size : 0.37(H)*0.21(V) mm
Sample-detector distance: 0.8 – 31 m
SAXS Detector : Rayonix MX-170HS, PILATUS3 300K, FReLoN 4M
WAXS Detector : RayonixLX-170HS

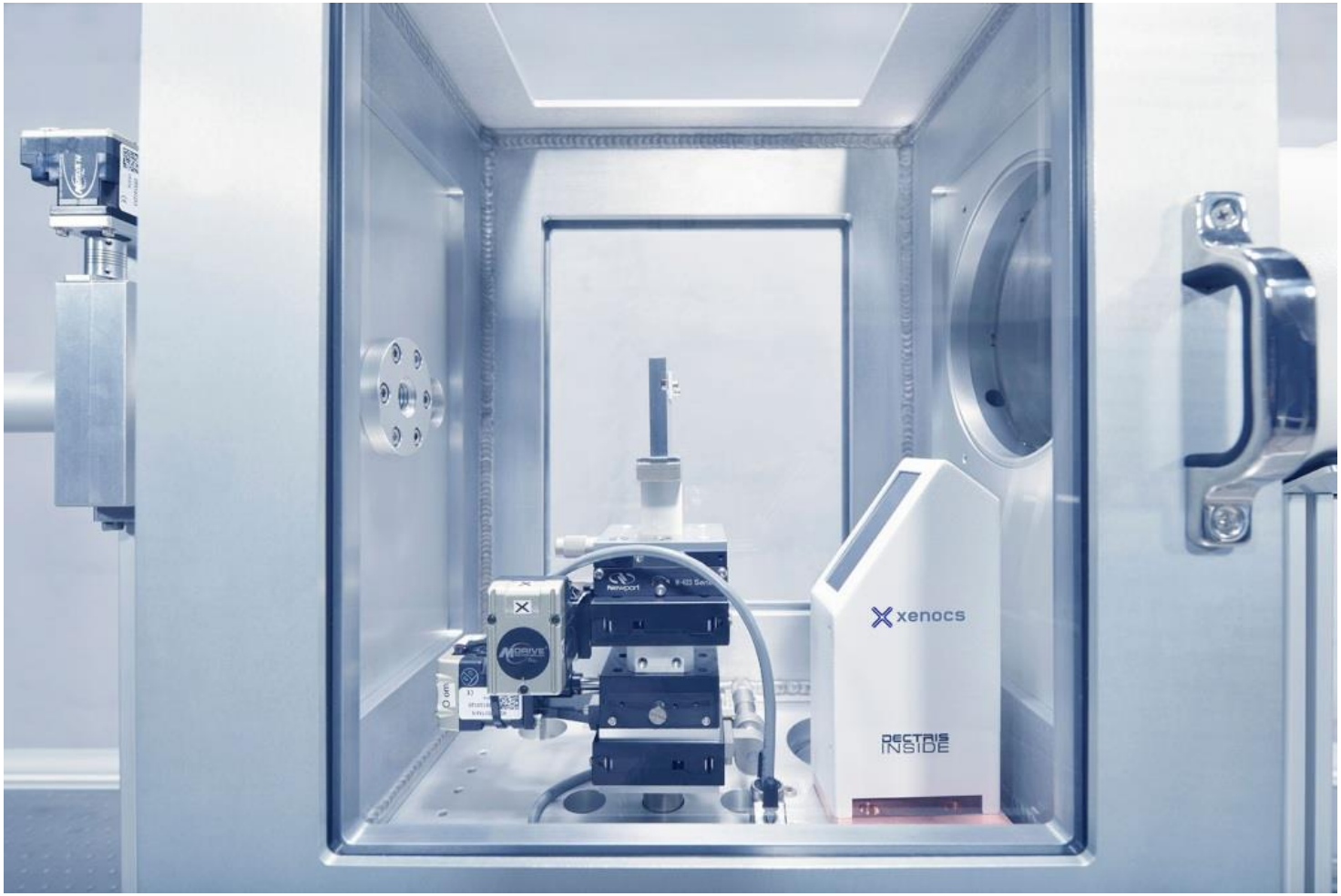
Problems :

Soft condensed matter
Non-crystalline structural biology
Interdisciplinary areas of soft matter and nanoscience
Industrial

Xenocs' SAXS station

Xenocs' SAXS station

Sample environment

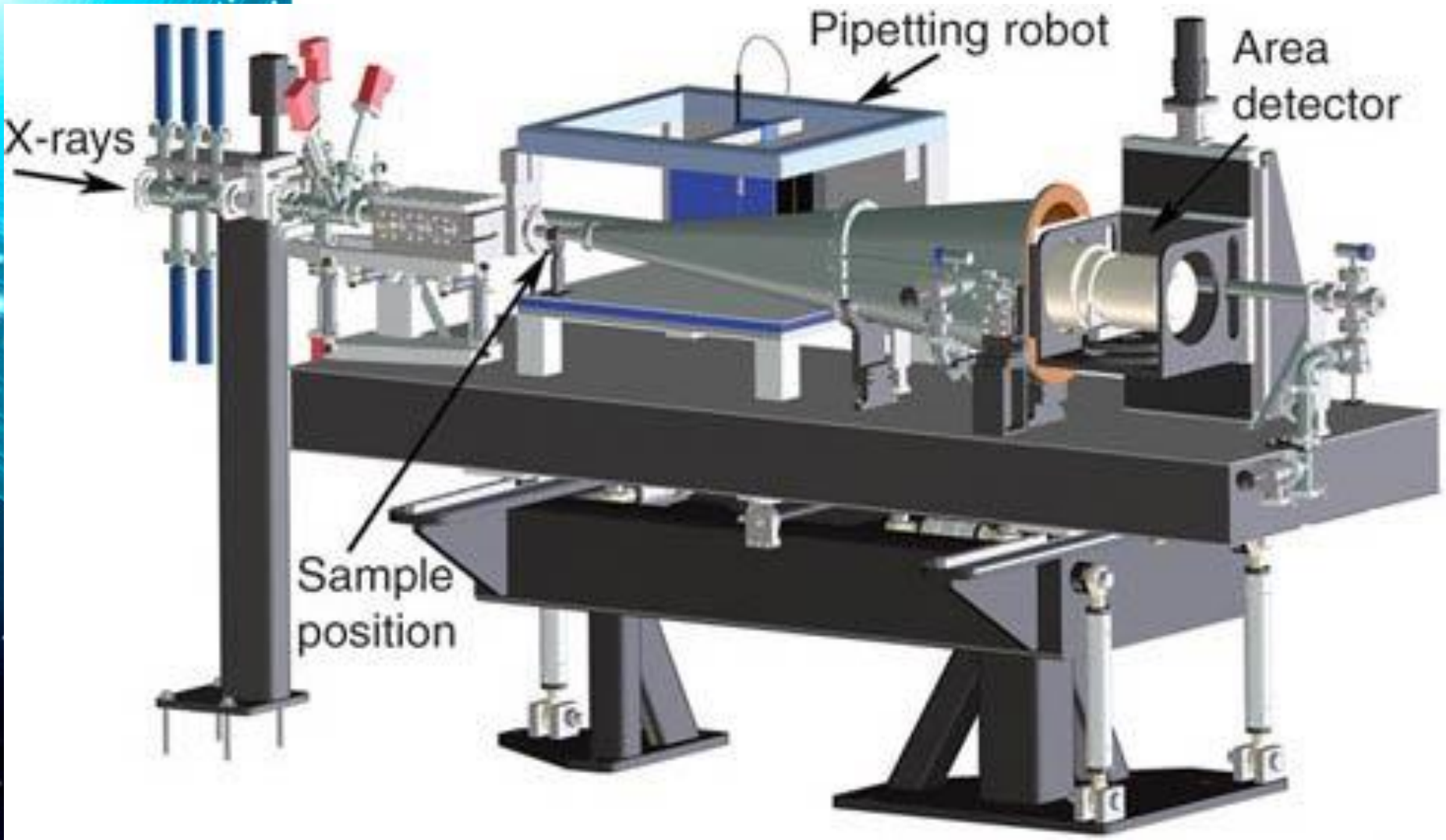


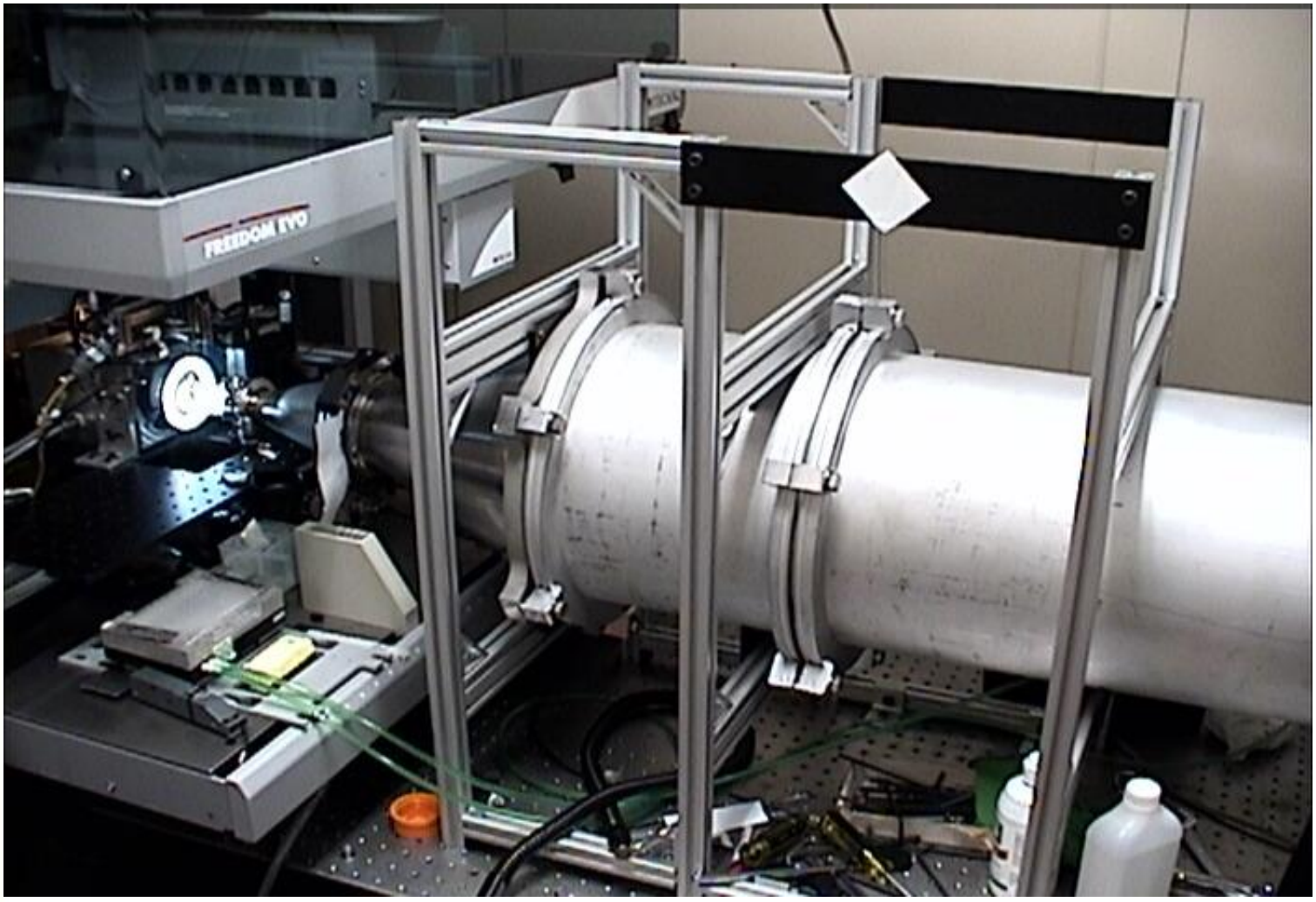
Comparison of the concepts

Ex vacuum tube	In vacuum tube
Hardly adjustable sample-detector distance	Vacuum compatible mechanics and detectors
Non-vacuum compatible detectors and mechanics	Easy adjustable sample-detector distance
	Hard- and firmware limited sample environment
Flexible sample environment (mostly selfmade)	
	Price
Lower cost	

Thanks!

Advanced Light Source: High-Throughput SAXS




FREEDOM EVO