

Characteristics of the ID10-EH1 – grazing incidence scattering and diffraction end station.

Grazing Incidence Scattering and Diffraction (GISD) at EH1	
Source characteristics	
Source size (electron)	928 μm (H) x 23 μm (V) (FWHM)
Source divergence (electron)	25 μrad (H) x 17 μrad (V) (FWHM)
Undulators types	Three in-air: (a) U35, (b) revolvers U27 / U35, (c)U27
Undulator parameters	Period: 27 mm (U27) / 35 mm (U35) Length: 1.61 m Minimum gap: 11 mm Magnet material: NdFeB K_{max} 1.36 (U27) / 2.34 (U35)
Brilliance (ph/s/0.1% BW/mm ² /mrad ² /100mA)	10^{20} at 8 keV
Primary Optics	
White beam double mirror	Harmonic rejection / pink beam mode Horizontal geometry Incidence angle: 2.6-3.5mrad (0.15°-0.2°) Fixed exit (offset: 3.2 mm) Three horizontal bands: Si / Pd / Pt 1 st mirror length: 382mm 2 nd mirror length: 500mm
Monochromator	Channel cut crystal monochromator (offset: 9.5-10 mm) Liquid N ₂ -cooled Vertical diffraction plane Symmetric Si (111): 7-25 keV Symmetric Si (311): 14-30 keV
Secondary source	Vertical and Horizontal: Slits (monochromatic beam)
Focusing Optics	
UHV Transfocator (Be-CRLs)	Geometry: $p_1 = 36$ m; $q_1 = 8.5$ mm Lens curvature radius 300 μm
Focused beam size	220 μm (H) x 6 μm (V)
Beam properties	
Energy range	7-30 keV
Energy resolution	$\Delta E/E = 1.4 \cdot 10^{-4}$ (Si(111)); $\Delta E/E = 2.7 \cdot 10^{-5}$ (Si(311));
Flux : ph/s/mm ² /100mA (monochromatic beam)	$\sim 2 \cdot 10^{13}$ @8keV
Experimental configurations	
Scanning and non-scanning modes	Grazing Incidence Diffraction (GID) Grazing Incidence Diffuse Scattering (GIS) Grazing Incidence Small-Angle X-ray Scattering (GISAXS) X-ray Reflectivity (XRR) High-resolution X-ray diffraction (HXRD) Total Reflection X-Ray Fluorescence (TRXF)
Experimental environment	
Langmuir trough for gas-liquid and liquid-liquid interface.	
Detector systems	
XRR	0D: Scintillation counter, APD; 1D: Vantec
GISAXS	2D: 1x5 MAXIPIX, PILATUS 300K (from Soft Matter group)
GID and GIS	2D: 1x5 MAXIPIX, PILATUS 300K; 1D: Mythen
TXRF	Vortex
HXRD	oD: Scintillation counter, APD; 1D: Mythen; 2D: 1x5 MAXIPIX