SPring-8 meV-IXS Program Overview

Alfred Q.R. Baron

SPring-8 has had a meV-resolution IXS program for just over 2 decades, now with two IXS spectrometers one at BL35XU[1] and one at BL43LXU[2]. The table summarizes many of the relevant capabilities. This talk will discuss the status of the beamlines and the opportunities available, as well as the main programs now in progress. An overview of IXS and different spectrometers and beamlines can also be found in [3].

	BL35XU	**BL43LXU**
Administration	JASRI (~50/50 IXS/NRS)	RIKEN (10-15% JASRI)
Momentum Transfer	~1-100 nm^{-1} (at 21.7 keV)	
2D Analyzer Array	12 Channels: 4(H) x 3(V)	28 Channels: 7(H) x 4(V)
Operating Resolution (Analyzer dependent)	1.3 meV at 21.75 keV (2.8 meV at 17.79 keV)	(0.8 meV at 25.7 keV) 1.3 meV at 21.75 keV 2.8 meV at 17.79 keV
Beam Spot Size (Diameter, FWHM)	~80 um Standard ~18 um Possible	~50 um Standard ~5 um Possible
Typical Setups	Single Crystal Work (2-800K) Disordered Materials (Liquids, Glasses, *etc.*) High Pressure Diamond Anvil Cells (DACs)	
Note: other specialized setups may be available in collaboration with user groups.		
Specializations	Thin Films At Grazing Incidence	High Pressure DAC [5] Masks for Low Q<~1 nm^{-1} High Field (7T) Magnet
Main Contact Person	Hiroshi UCHIYAMA uchiyama@spring8.or.jp	Alfred Q.R. BARON baron@spring8.or.jp

Both beamlines have 2-dimensional analyzer arrays that are particularly efficient for investigating the dispersion of transverse modes [3]. Both beamlines also use backscattering monochromators that provide extremely good (e.g. ~0.1 meV/week) stability for the energy zero. Recent work investigating the resolution function [4] has improved fitting for glasses.

After the reduction in beamtime due to the BL35 "upgrade", BL35/IXS will try to focus primarily on 1.3 meV resolution work, with a specialization for grazing incidence setups for thin films. BL43LXU continues to run a robust setup for work with DACs (pressures up to ~300 GPa) mostly with 2.8 meV resolution, while the work-horse instrument for crystal dynamics runs at 1.3 meV resolution, and, in special cases, sub-meV resolution can be used for targeted measurements.

[1] J. Phys. Chem. Solids **61**, 461 (2000) [2] SPring-8 Inf. Newsl. **15**, 14 (2010) [3] Handbook I and Handbook II and arXiv 1504.01098. [4] Ishikawa, J. Synch. Rad. **28**, 804 (2021) [5] Baron, Ishikawa, Fukui, and Nakajima, AIP Conf. Proc. **2054**, 20002 (2019).