

High-Resolution Hard X-ray Spectroscopy Beamline Designed at Shenzhen Innovation Light-source Facility (SILF)

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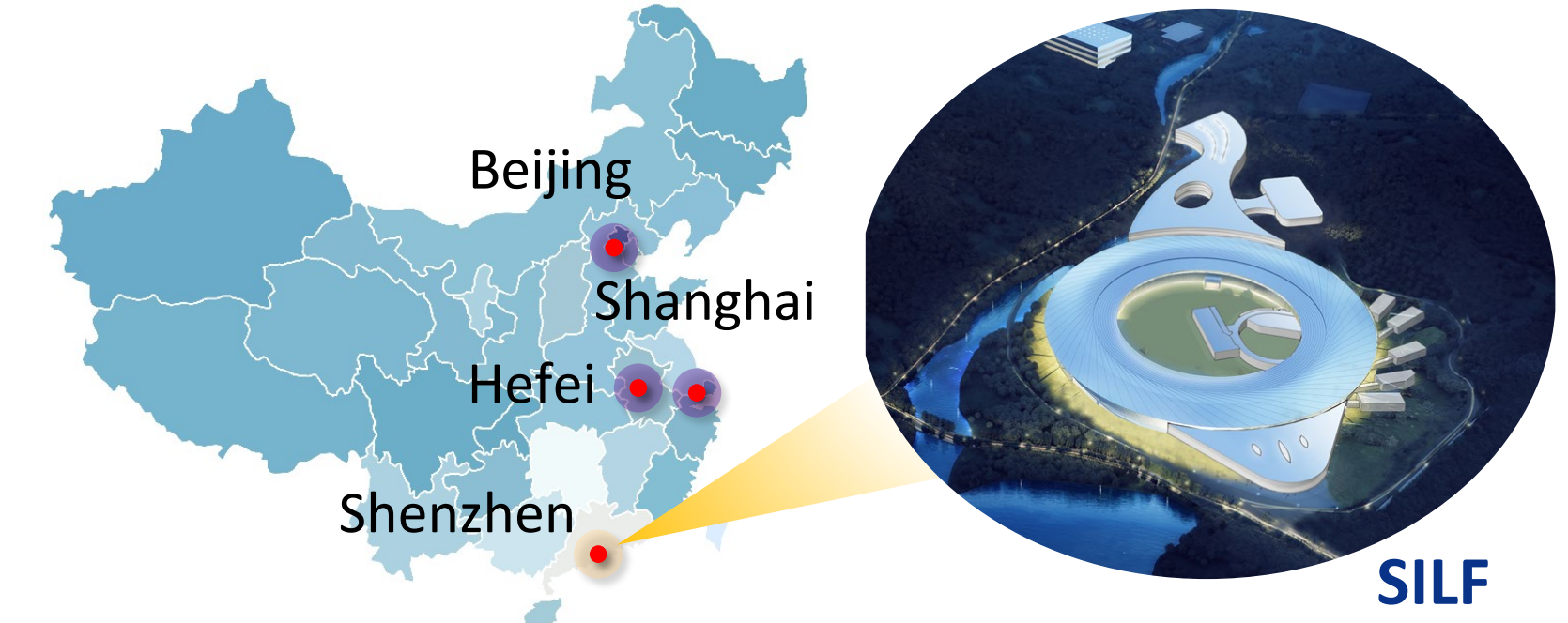


Introduction

Shenzhen Innovation Light-source Facility (SILF) is a newly proposed fourth-generation synchrotron light source in China. In the first phase, a high-flux undulator beamline for high-resolution hard X-ray spectroscopy and hard X-ray photoelectron spectroscopy, named as High-Resolution Hard X-ray Spectroscopy Beamline, will be designed and constructed to facilitate advanced research and industrial innovations.

SILF Project

The Shenzhen Innovation Light-source Facility (SILF) is a synchrotron radiation infrastructure project that is set to be constructed in Guangming Science City, Shenzhen. It will serve as China's fourth synchrotron light source, joining the existing facilities in Beijing, Shanghai and Hefei. SILF aims to provide a cutting-edge research platform for scientists and industries in the Greater Bay Area of China even from around the world.

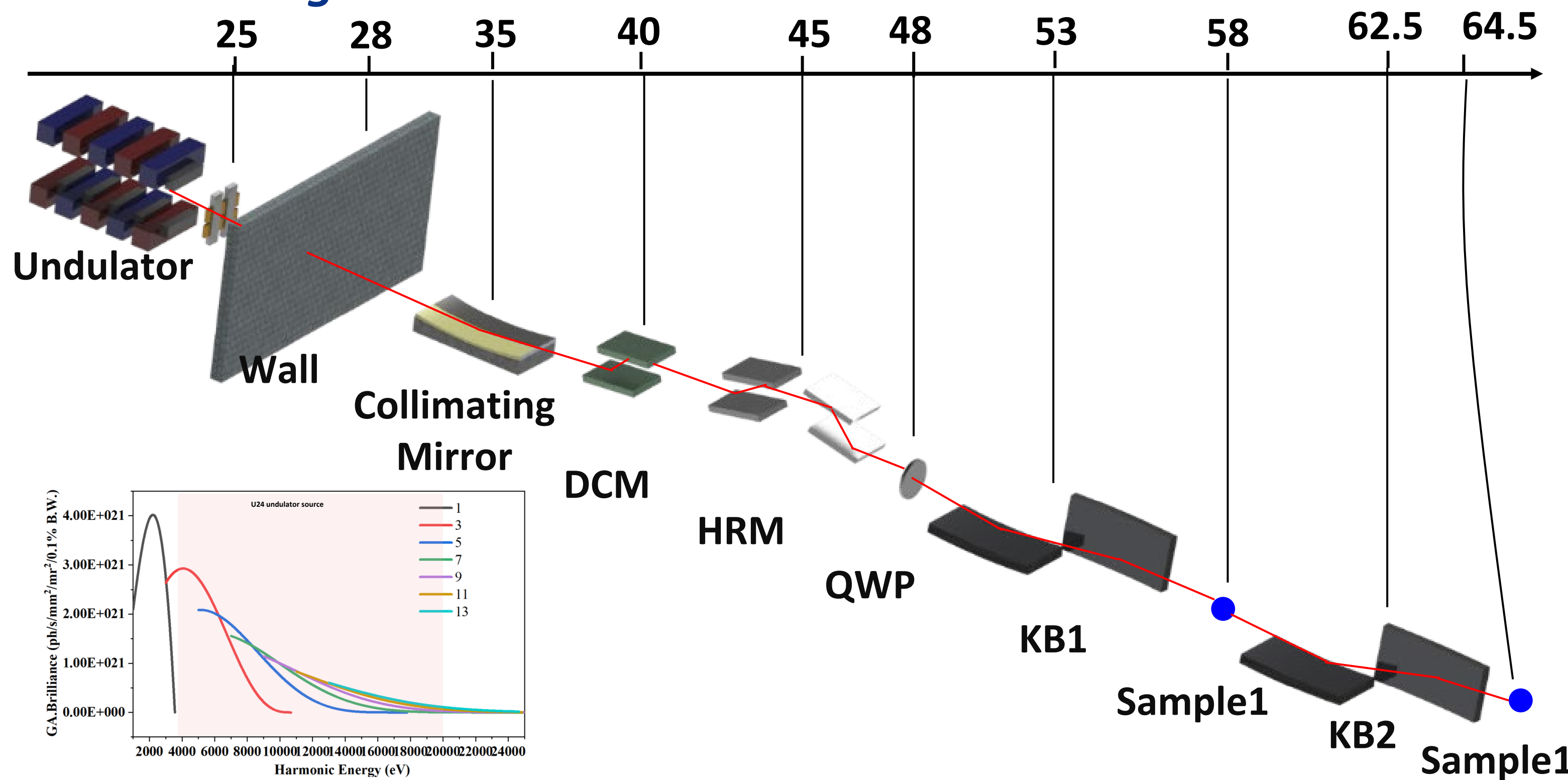


High-Resolution Hard X-ray Spectroscopy Beamline

Introduction

The beamline is equipped with a double-crystal monochromator, a high harmonics suppression mirror and Kirkpatrick-Baez mirror pairs, providing 3.4~18 keV hard X-ray with a focused spot size of 15 μm^2 . It will be dedicated to high energy resolution fluorescence detected X-ray absorption spectroscopy (HERFD-XAS), X-ray Emission Spectroscopy (XES), resonant inelastic X-ray scattering (RIXS) and hard X-ray photoelectron spectroscopy (HAXPES) measurements for advanced materials research.

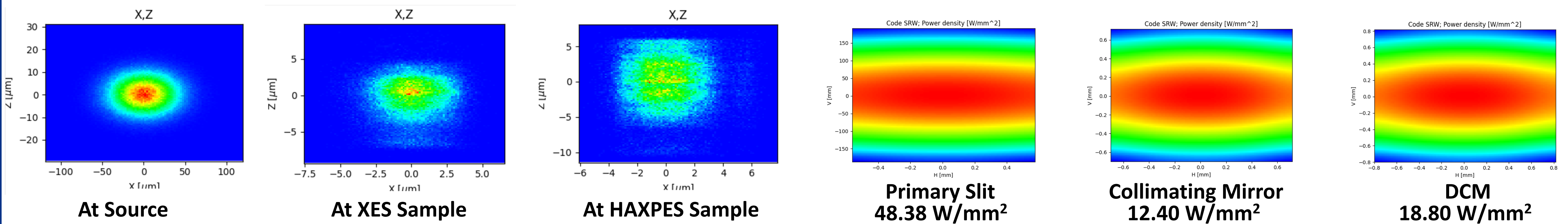
Beamline Design



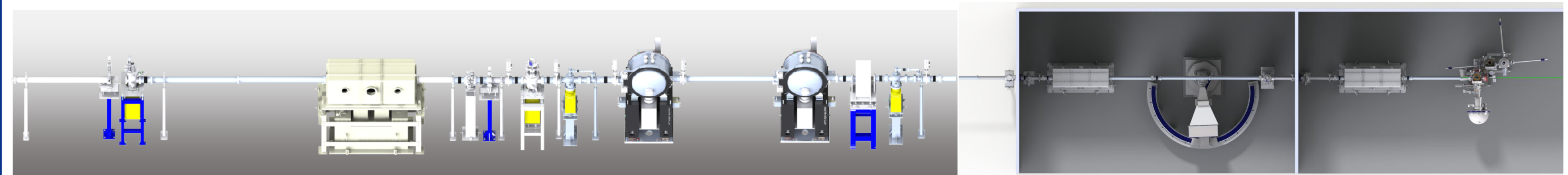
Beamline Specifications

Section	Parameter	Design Specification
Beamline	Energy Range/keV	3.4~18
	Energy Resolution ($\Delta E/E$)	1×10^{-4} @7.79keV
	Max Flux on Sample/(phs/s/0.1%bw)	2×10^{13} @7.79keV
EH 1: XES	Spot Size on Sample /(μm^2) (H×V)	15×15
	Energy Resolution ($\Delta E/E$)	≤ 1 eV@7.79keV
	Max Flux on Sample/(phs/s)	1×10^{13} @10keV
EH2: HAXPES	Spot Size on Sample /(μm^2) (H×V)	10×10

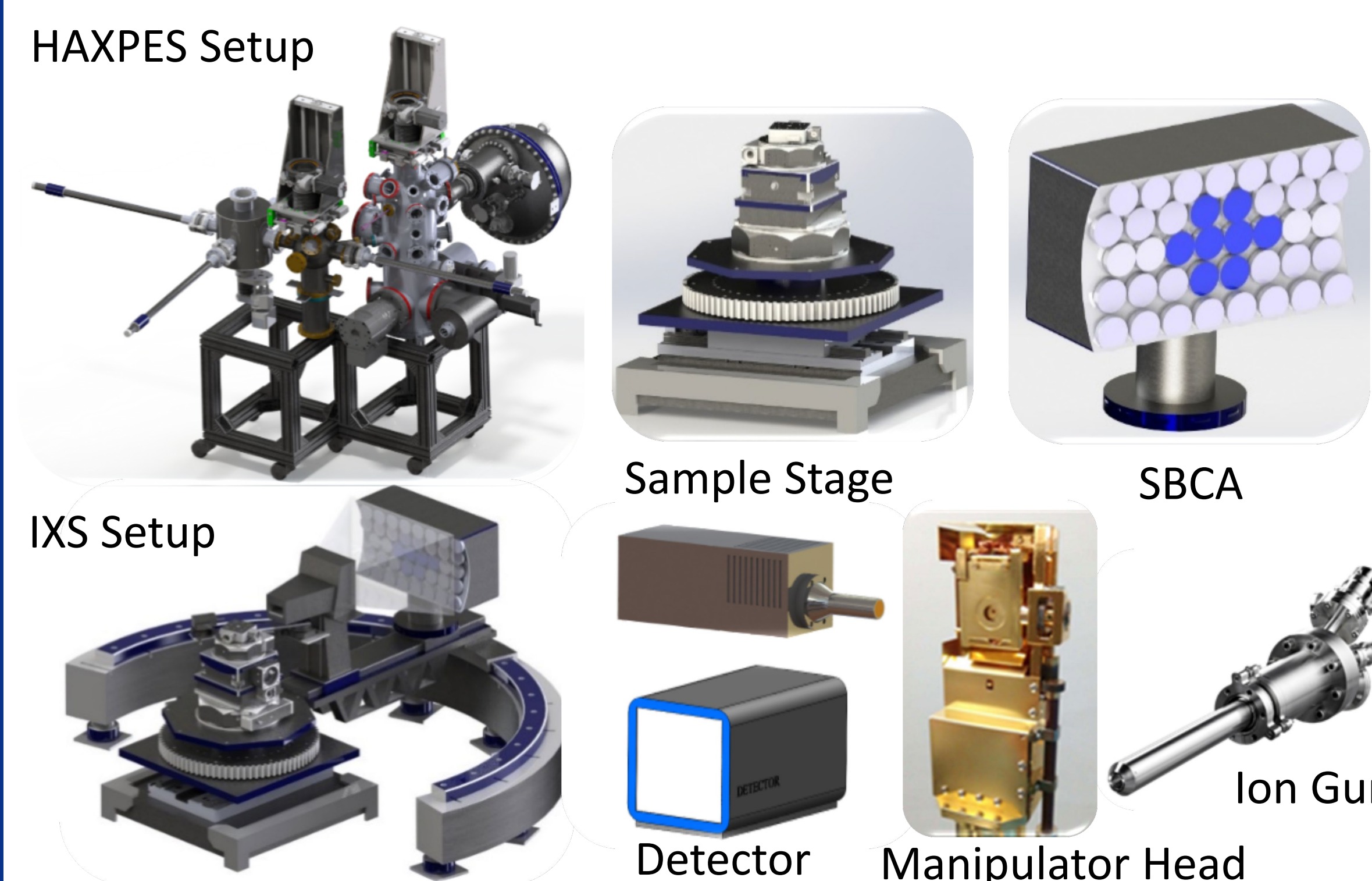
X-ray tracing and thermal analyses



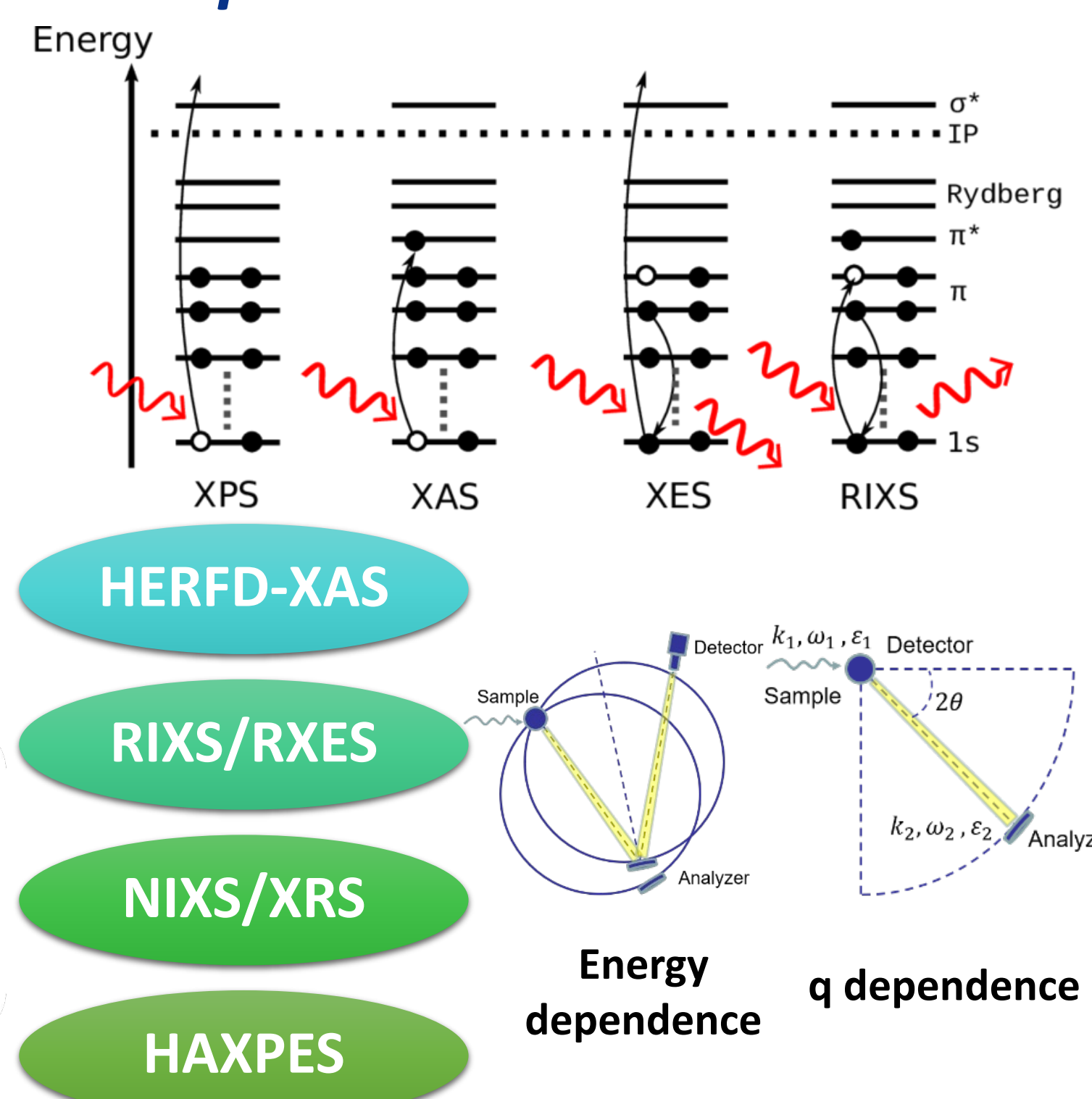
Beamline Layout



Instrumentation

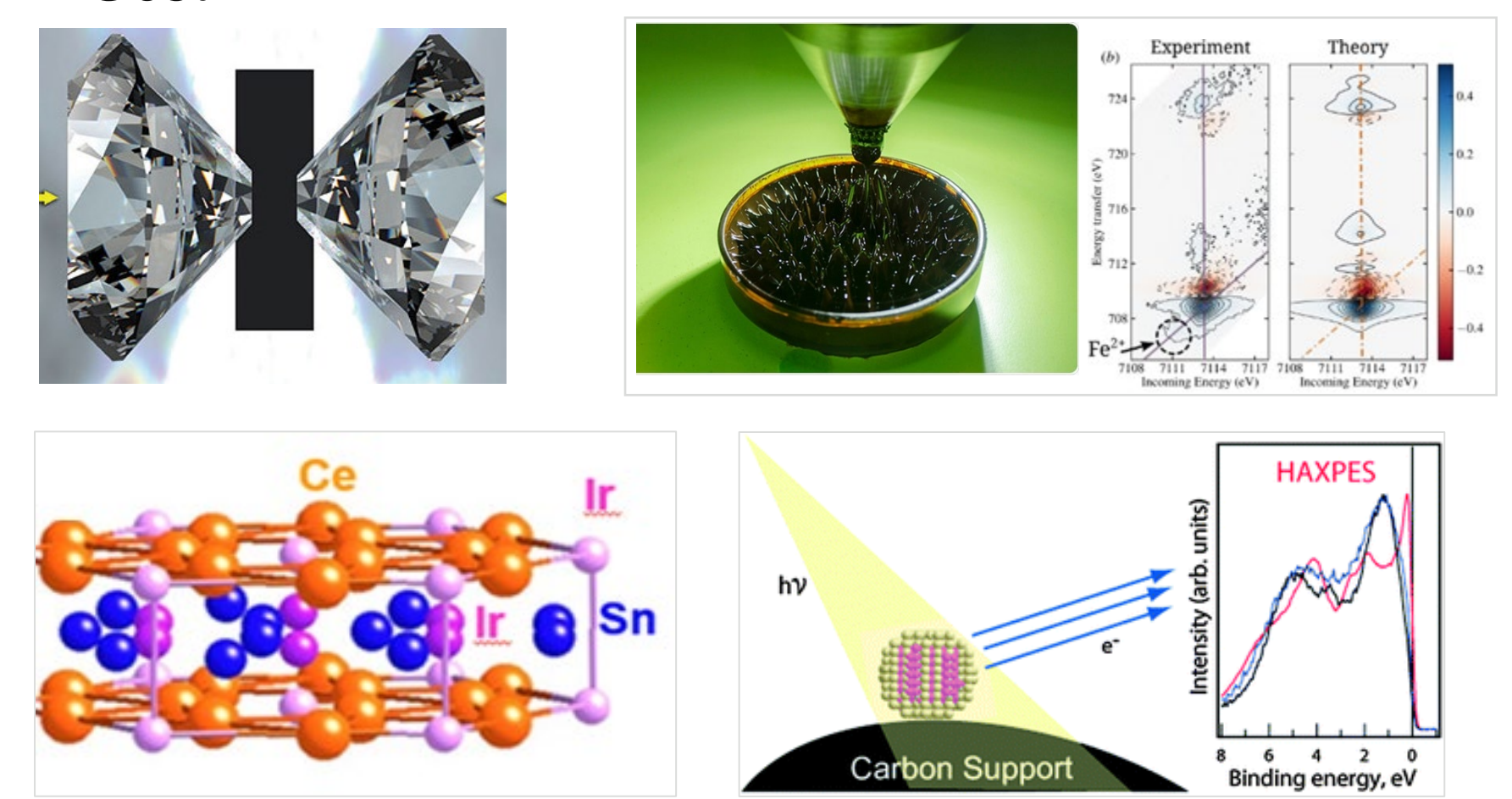


Techniques



Applications [1,2]

- Catalysts
- Energy Materials
- Strongly correlated materials
- Environmental Sciences
- etc.



Reference:
[1] Kiuchi, Hisao, et al. *Electrochemistry Communications* 118 (2020): 106790.
[2] Anniyev, Toyli, et al. *Physical Chemistry Chemical Physics* 12.21 (2010): 5694-5700.