

Solid flexRIXS: A RIXS endstation for solid systems at BESSY II

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Abstract: The solid flexRIXS endstation combines an X-ray emission spectrometer with resolving powers above 1000 with a diffractometer setup for solid sample systems. It is flexible in its use at different beam lines and facilities.

1 Introduction

The solid flexRIXS is an endstation for complementary application of RIXS, diffraction (resonant scattering) and absorption measurements both at BESSY II and free-electron lasers. This endstation is equipped with a two-axis rotatable sample holding manipulator (one axis motorized). The sample stage can be cooled with liquid Helium and in a different configuration also heated by electron bombardment heating to more than 1000°C. Sample drain current can be measured for total electron yield absorption measurements and a photodiode (optionally with a biased mesh to repel electrons) can be used for diffraction / resonant scattering experiments as well as fluorescence yield detection.

Furthermore, the endstation is equipped with a modified Grace IV / XES 350 spectrometer that can cover a photon energy range from 50 to above 900 eV. Resolving powers above 1000 have been shown to be easily achievable and can be furthered at the expense of count rate. The emission is dispersed from three different gratings to cover the full energy range with optimal count rate. The dispersed light is detected by an MCP, phosphor screen, CCD combination. The system is completely software-controlled so that long macros can be used for extended measurement plans. The detectors can be made blind to optical radiation so that it can be used in pump-probe setups to study dynamics at BESSY II and FELs. Non-linear X-ray spectroscopy can be conducted with this setup as well. The chamber is open for collaborative research at BESSY II and FELs.

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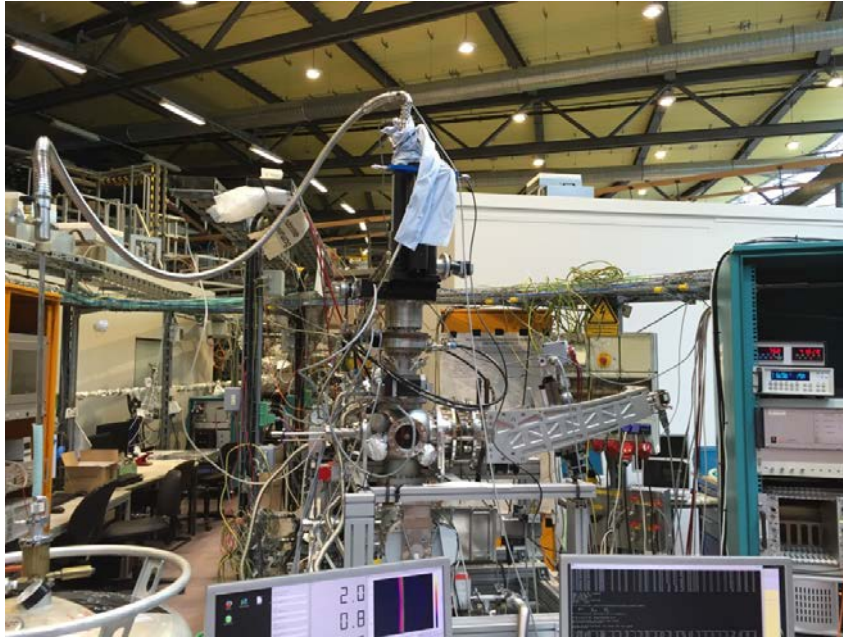


Figure 1: View of the Solid flexRIXS endstation.

2 Instrument application

Typical applications are:

- RIXS of correlated materials across phase transitions
- RIXS of catalyst materials
- Angle dependent fluorescence yield studies
- Soft X-ray resonant reflectivity measurements
- Pump-Probe RIXS experiments
- Pump-Probe fluorescence yield and scattering studies
- Non-linear X-ray spectroscopy

Methods:

- Time-resolved studies
- NEXAFS
- RIXS

3 Technical Data

Monochromator	flexible
Experiment in vacuum	yes
Temperature Range	20-550 K
Detectors	Photodiode, MCP
Manipulators	Four axes motorized + one by hand

Table 1: Technical parameters of the Solid flexRIXS endstation.

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