



# The $\mu$ mRIXS spectrometer at BESSY II

Helmholtz-Zentrum Berlin für Materialien und Energie \*

Instrument Scientists:

- Dr. Annette Pietzsch, Helmholtz-Zentrum Berlin für Materialien und Energie  
phone: +49 30 8062-12919, email: [annette.pietzsch@helmholtz-berlin.de](mailto:annette.pietzsch@helmholtz-berlin.de)

**Abstract:** The  $\mu$ mRIXS confocal plane grating spectrometer offers high resolution resonant inelastic x-ray scattering (RIXS) spectroscopy in the soft x-ray range between 90 eV and 1000 eV. The small focus of its dedicated beamline allows for spectroscopical imaging at selected sample sites with a spatial resolution of 1 micrometer.

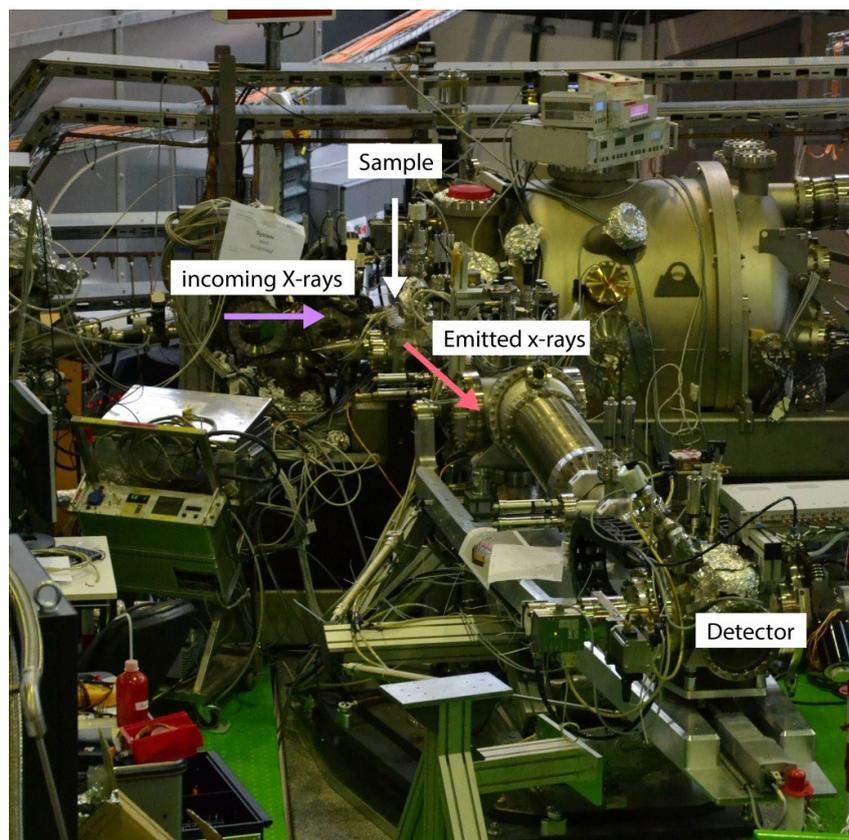
## 1 Introduction

The  $\mu$ mRIXS plane grating spectrometer consists of two parabolical mirrors with a plane grating in between. The first mirror collects and collimates the radiation from the  $1 \times 4 \mu\text{m}^2$  beamline microfocus on the sample onto the grating while the second mirror focusses the diffracted light onto the detector. The spectrometer houses two laminar grating structures on a common substrate: 1050 l/mm for high transmission and 4200 l/mm for high resolution. The photons are detected by a PHOTONIS multi channel plate (MCP) stack in combination with a RoentDek delay line detector DLD-120. The MCP channel diameter is 25  $\mu\text{m}$  and the top MCP is coated with CsI to improve the quantum efficiency of the detector. The samples are mounted in the solid state experimental chamber directly to a Janis ST-500 Microscopy Cryostate which allows for a maximum stability of the sample position. To avoid mechanical instabilities in sample positioning, no sample translation stage is installed, but the whole vacuum chamber can be positioned by a 3-axis Huber table vertically and in the horizontal plane. Rotation of the sample around the vertical axis is achieved via a rotation of the microscope cryostate.

The  $\mu$ mRIXS spectrometer is permanently situated at the UE49-SGM beamline while the solid state experimental chamber can be exchanged for the coherent X-ray scattering (CXS) chamber.

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Figure 1: View of the  $\mu$ RIXS spectrometer.

## 2 Typical applications

- RIXS with micrometer focus on solid samples
- Fluorescence yield absorption spectroscopy with micrometer focus
- Temperature dependent measurements

## 3 Technical Data

Energy range	Soft X-rays from 90 to around 1000 eV, resolving power better than 2000
Sample environment	Solid samples in vacuum, sample transfer
Temperature range	From liquid helium temperatures to 600 K
Detectors	Plane grating spectrometer with MCP stack + Delay line detector, GaAs photodiode
Manipulators	He cryostate with 4 degrees of freedom, all motorized

Table 1: Technical parameters of the  $\mu$ RIXS spectrometer.

## References

Könnecke, R., Follath, R., Pontius, N., Schlappa, J., Eggenstein, F., Zeschke, T., ... Föhlisch, A. (2013). The confocal plane grating spectrometer at BESSY II. *Journal of Electron Spectroscopy and Related Phenomena*, 188, 133 - 139. <http://dx.doi.org/10.1016/j.elspec.2012.11.003>