Operational experience with the new high energy resolution soft X-ray RIXS beamline at the ESRF

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As part of the phase I upgrade of the ESRF a new soft x-ray beamline for Resonant Inelastic X-ray scattering (RIXS) was built at ID32 of the ESRF. The spectrometer was built in collaboration with G. Ghiringhelli and L. Braicovich (Politecnico di Milano) and covers the photon energy range of 400-1500eV. This beamline has been operational now for 2 years. In this talk our experiences with operating a state of the art RIXS instrument will be described.

The beamline was designed to have a resolving power of ∼30000 at the Cu L edge (∼930eV) but in addition implemented several other important features. Notably the 10m spectrometer can be continuously moved over 100 degrees under vacuum. Combined with an in-vacuum 4 circle goniometer this has opened the possibility of real 3D mapping of loss peaks [1]. In addition a 2θ scattering arm in sample chamber allows RIXS experiments to be combined with RXES elastic scattering experiments. A multilayer polarimeter [2] also enables the polarization dependence of the RIXS spectra to be determined permitting for instance magnetic and non-magnetic scattering features to be separated. These aspects will be highlighted in the talk and illustrated with examples. Finally future plans for further instrumental improvements will indicated.

ID32 ERIXS spectrometer

References

[1] Three-dimensional dispersion of spin waves measured in NiO by resonant inelastic x-ray scattering, Betto et al. PRB **96**, 020409(R) (2017).

[2] The simultaneous measurement of energy and linear polarization of the scattered radiation in resonant inelastic soft x-ray scattering, Braicovich et al. Rev. Sci. Inst. **85**, 115104 (2014).