QuaRX

QuaRX will offer RIXS spectroscopy at exceptionally high resolution (>100.000 resolving power) while providing reasonable photon flux. This will enable the study of collective excitations in quantum materials, e.g. magnons and orbital excitations in altermagnetic systems, allow to probe out-of-equilibrium phenomena, such as spin currents, intertwined lattice, spin and electronic degrees of freedom as well as investigating interacting quasiparticles). Furthermore, molecular systems will be studied at high (but not highest) energy resolution and increased flux. The high energy resolution is enabled by the brilliance of BESSY III, optimised undulator parameters as well as a very long beamline, which can much more easily be built at a green-field facility. The experiments on molecular systems will profit from a strong local expertise for experiments on liquids, including the respective sample environment (*cf.* DELIXIRS instrument).

Instrument	QuaRX *(Quasi-particle RIXS)*
Contact	Klaus Habicht (habicht@helmholtz-berlin.de) Annette Pietzsch (annette.pietzsch@helmholtz-berlin.de)
Source(s)	Undulator IVUE42 (150 – 6000 eV, fully variable polarisation)
Beamline capabilities	• Energy range: 250 eV to at least 2000 eV; extension up to 3500 eV (using multilayer optics) is evaluated • Combined resolving power: >120 000 (at Cu L-edge) • Spot size: 1 × 10 µm^2 • Flux: ≈5*10^{11} ph/s The beamline will permit switching between a high-resolution and a high-flux mode by changing the grating. The high-flux mode will permit experiments on molecular systems, for which a separate chamber and spectrometer are foreseen to avoid cross-contamination.
Techniques	• RIXS, RIXS-MCD • XAS, XES
Sample environment	• Various exchangeable manipulators with optional vibration-free, closed-cycle, multi-staged pulsed tube coolers providing temperatures down to 2 K • Sample heating capabilities up to 800 K • Heating stage providing temperature gradients ΔT • Magnetic fields B (vertical and in scattering plane): 0 - 2 T • Electric fields E • Molecular systems: liquid jets, flow cells, gas jet/pinhole