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The new end-station PEAXIS for RIXS and XPS measurements at the BESSY II synchrotron

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The electronic states and their dynamics determine important functional material properties such as charge and, via electron-phonon coupling, also heat transport. Thus a profound understanding of the microscopic mechanisms underlying electrical conductivity and its coupling to thermal conductivity is gained by probing the electronic structure.

The new end-station PEAXIS built at BESSY II combines two important experimental methods for electron spectroscopy in a single UHV system. Resonant Inelastic X-ray Scattering (RIXS) and X-ray Photoelectron Spectroscopy (XPS) allow wavevector-resolved band mapping of electronic states in a broad range of functional materials. A dedicated focus is on solid state samples since PEAXIS features a large wavevector range accessible by the continuous rotation of the RIXS arm and offers solid-state sample manipulators covering a temperature range from 10 to 1000 K.

In our presentation we report on the capabilities of the PEAXIS instrument and the results of our commissioning experiments. The beamline covers an incident energy range from 200 eV to 1200 eV and provides a beam spot size as small as $3.8 \mu\text{m} \times 12.4 \mu\text{m}$ at the sample position. PEAXIS provides excellent energy resolution which has been experimentally demonstrated to exceed a resolving power of 10000. RIXS measurements on liquid acetone and on electronic *d*-states in NiO show that PEAXIS is competitive to state-of-the art RIXS instrumentation at third-generation synchrotron facilities.

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