Contribution ID: **230** Type: **Poster**

Sub-micrometer angle-, spin-, and polarization-dependent photoelectron spectroscopy in the tender X-ray regime

Tuesday, 18 September 2018 17:15 (15 minutes)

ASPHERE III is an angle-, spin-, and position-resolving photoelectron spectrometer that fully exploits the unique capabilities of the variable polarization tender X-ray beamline P04 of PETRA III. Combining a Scienta DA30 photoelectron analyzer with installed 3D-Mott detector and the brillant, widely tunable (250–3000 eV), and highly monochromatic photon beam of the beamline or, complementary, with the monochromatized beam of a VUV-He- and Xe-plasma source, the experimental setup enables a direct comparison between bulk and surface electronic structures of solids. Employing the DA30 deflector driven angle mapping mode and the UHV goniometer that rotates the analyzer around the sample, complete three-dimensional band structures and Fermi surfaces without sample rotation can be determined efficiently.
After the permanent integration of ASPHERE III into the beamline sector in 2019 the spatial resolution is aimed to be in the sub micrometer range and will be available for all ASPHERE III related spectroscopic methods.
To connect the measured spin-, momentum- and position-resolved electronic structure directly with the geometric structure, additional XPD investigations from the same spot on the sample and STM and LEED investigations from the same sample surface can be performed. All spectroscopic techniques are available during sample temperature changes controlled with a He-flow cryostat as well as during metal deposition on sample surfaces.

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Session Classification: Poster session 2

Track Classification: P1 Instrumentation and methods