Joint PhD Studentship with Diamond Light Source, UK

In-situ gating and strain-tuning of electronic properties of correlated oxide heterostructures [STU0445]

Supervisors:

Prof. Ralph Claessen and Prof. Michael Sing, Experimentelle Physik 4, University of Würzburg, Germany

Dr. Tien-Lin Lee, Diamond Light Source Ltd, UK

Unlike semiconductors or simple metals, many transition metal oxides exhibit unsusual electronic properties that arise from electron-electron interactions. Perhaps the most fundamental and striking example of this is the Mott insulator in which the motion of *d*-electrons is blocked for integer band filling by the short-range Coulomb repulsion. By changing the band filling and/or the width of the *d*-bands, such Mott insulators can be turned into correlated metals, making them promising candidates for novel nanoelectronic applications such as (Mott) transistors.

In this project, conducted in a collaboration with Beamline I09 at Diamond Light Source, such materials are integrated into oxide heterostructures. In this way, the Mott transition can be controlled by applying a gate voltage and strain, thereby varying the band-filling and width, respectively.

The project will involve pulsed laser deposition and pre-characterisation of thin film samples at the University of Würzburg and *in situ* gating and strain-tuning experiments at I09 exploiting state-of-the-art soft X-ray angle-resolved photoemission spectroscopy (SX-ARPES) and hard X-ray photoelectron spectroscopy (HAXPES). Applicants are expected to have a good understanding of solid-state physics and be motivated to develop advanced experimental skills.

For more information contact:

claessen@physik.uni-wuerzburg.de

sing@physik.uni-wuerzburg.de

tien-lin.lee@diamond.ac.uk

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