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X-Ray Spectroscopy of Multifunctional Oxides

Wednesday, 19 September 2018 10:45 (30 minutes)

Beyond their traditional role as dielectrics, oxides are fascinating quantum materials showing a multitude of behaviours –such as (multi-)ferroic, memristive, nonlinear optical and topological effects –which are promising for potential memory, logic and sensoric functions. Oxide materials may enable the efficient transformation between electronic and chemical states –and as such hold a key towards the development of sustainable energy materials and future nanoelectronic technologies.

We currently experience the intertwining of the fields of quantum materials and semiconductor physics, and the emerging field of complex oxide heterostructures applies the prosperous experimental tools and concepts of semiconductor physics to the oxides –which exhibit even richer and tunable physical properties. The collective properties of the constituent electrons in complex oxide heterostructures give rise to exotic physical states, emerging phenomena and novel device functionalities, that have no counterpart in any other material systems.

We will review the significance of X-Ray spectroscopy techniques for investigating electronic, chemical, magnetic states and phase transitions in functional oxides. To date, research activities using photon-based methodologies are striking for both attaining ground-, metastable- or transient states with the perspective to tune and control novel functionalities in quantum oxides.

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