UNIVERSITÄT DUISBURG ESSEN

PHYSIK E=

Physikalisches Kolloquium

Mittwoch, 10.01.2024
13:00 Uhr
MC 122 und Zoom

https://uni-due.zoom-x.de/j/64228670246?pwd=RjVQeFNIUkRKRkpiNVpKYXhJaFNLdz09

Atomic Architecture: structural, chemical, and electronic insights to new quantum materials

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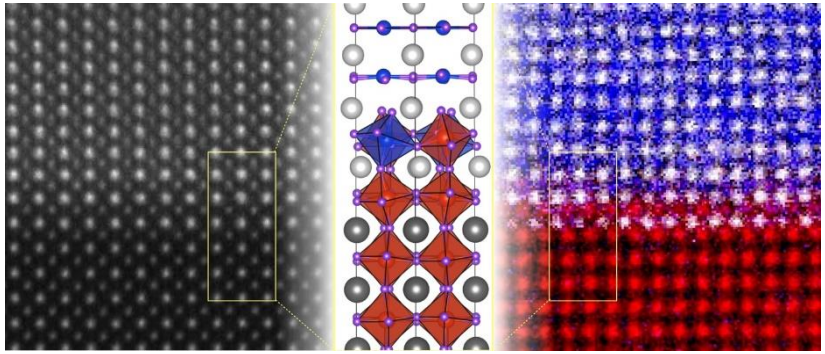

The exotic and functional behaviors of correlated materials are driven by rich interplay between atomic lattice, orbital, charge, and spin degrees of freedom. With the ability to directly probe many of these relevant order parameters all the way down to the atomic scale, the transmission electron microscope (TEM) and related techniques offer unique insight to the nanoscale origins of macroscopic properties. Here, I will highlight examples which leverage a suite of TEM methods to illustrate how detailed characterization spanning Ångström to micron length scales contributes new insights to the underlying physics in novel materials. With a combination of mesoscopic in situ magnetic and atomic-resolution lattice imaging, I will show how subtle competition between local and global crystalline (dis)order can have an outsize impact on chiral magnetic textures in intercalated transition metal dichalcogenides. Next, I will focus on the recently discovered superconducting nickelates: a premier example of how breakthroughs in materials synthesis and characterization techniques over the past decades have enabled the realization and discovery of new materials families. I will illustrate how local measurements by advanced electron energy loss spectroscopy (EELS) combined with close collaboration between materials theory, growth, and characterization drives forward our understanding of this emerging family of superconductors.