SFB/TRR 21 - Colloquium

6. November 2015, Ulm

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(Harvard University)

Imaging and Analysis of Quantum Materials using Low Voltage Electron Microscopy

Quantum materials are atomically layered materials such as graphene or hexagonal boron nitride (h-BN). Their properties differ strongly from those of their 3D bulk state. Depending on the composition, quantum materials may act as conductors, insulators, semiconductors or even as superconductors. Especially combinations of different quantum materials are of high interest to explore new phenomena and act as the foundation for future electronic devices at the nanometer scale. Our research on quantum materials is widely spread, reaching from defect formation in graphene to the characterization of hybrid quantum materials. With transmission electron microscopy (TEM) we address the question, where the atoms are placed on the graphene. In addition, we will present our work utilizing Low-Voltage High-Resolution Electron Microscopy (LV HREM). Low voltage imaging has several significant advantages, including increased cross-sections for inelastic and elastic scattering, increased contrast per electron and improved spectroscopy efficiency, decreased delocalization effects and reduced radiation knock-on damage. Together, these often improve the contrast to damage ratio obtained on a large class of samples.

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