
Physics Colloquium

University of Missouri-Kansas City

Department of Physics

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Spectral Imaging of Electron Energy Loss Near Edge Structure Function Fields

Atomic-scale structure is the basis of all properties of matter including electronic, magnetic, mechanical, optical, superconducting, etc. Characterizing materials with novel properties is critical to their development and eventual commercialization, and this is where electron microscopy and spectroscopy play important roles. In recent years, the capabilities of scanning transmission electron microscopes (STEM) have advanced to include sub-angstrom resolution via aberration correction, the high angle annular dark field (HAADF) detection method, and the simultaneous collection of low scattering angle electron waves for use in electron energy loss spectroscopy. This has allowed experiments to see more and to see better, but there are still many situations that remain exceptionally challenging and effective interpretation of what is seen is often not trivial. Parallel to the rapid instrumentation development, and in response to the need for better interpretation, there has been steady and forceful progress on the theoretical front. This includes accurate ab initio calculations of electron energy loss near edge structure (ELNES) spectra. This presentation will center on recent advances in the theoretical calculation of ELNES spectra and how they can be used to assist and guide advanced microscopy and spectroscopy experiments. In particular, it will be shown how a function field of theoretical ELNES Spectra can be created and visualized as a spectral image.

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****Coffee at 3:10: Colloquium at 3:30 in Room 310****