

Title: Magnetic Field Mapping at the Nanoscale in the Transmission Electron Microscope

Abstract: Off-axis electron holography is a powerful technique for recording quantitative magnetic information about nanoscale materials in the transmission electron microscope. Recent developments include the use of specimen holders with electrical contacts to study nanoscale working devices and the use of ultra-stable microscopes to achieve improved phase sensitivity. I will present recent results from the use of a model-based approach to reconstruct the three-dimensional magnetization distribution in a specimen from holograms recorded as a function of specimen tilt angle. The approach avoids many of the artifacts that result from the use of backprojection-based tomographic techniques, as well as allowing additional constraints and physical laws to be taken into account. In such applications of electron holography, the sample must remain clean and undamaged for the time required to acquire images with a sufficient signal to noise ratio and the effects of electron-beam-induced charging and dynamical diffraction on the signal must be minimized.

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