

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Imaging atomic defects and quasiparticle interference in superconducting FeSe/SrTiO₃"

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Abstract: The potential of interface engineering to enhance electronic properties is exemplified in a monolayer of FeSe grown on SrTiO₃, which exhibits an order-of-magnitude increase in its superconducting transition temperature (T_c up to 110 K) compared to bulk ($T_c = 9$ K). Since this discovery in 2012, efforts to reproduce, understand, and extend this finding continue to draw both excitement and scrutiny. We use a combined molecular beam epitaxy (MBE) and scanning tunneling microscopy (STM) system to grow films of image films of superconducting FeSe/SrTiO₃. In this talk, we investigate and utilize atomic defects in as-grown films to derive microscopic insights in two directions. First, we characterize their local structure using density functional theory (DFT), with possible implications on film quality and nanostructuring. Second, we image quasiparticle interference (QPI) patterns generated around defects in order to reconstruct the electronic structure of the unperturbed system, and uncover pieces of the puzzle of high- T_c superconductivity in a monolayer of FeSe.

12:00pm
Tuesday, March 1, 2016
Duboc Room (4-331)