

Massachusetts Institute of Technology  
Department of Physics

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Condensed Matter Theory Seminar

“Scalable Majorana vortex modes in iron-based superconductors”

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**Abstract:** The iron-based superconductor  $\text{FeTe}_x\text{Se}_{1-x}$  is one of the material candidates hosting Majorana vortex modes residing in the vortex cores. It has been observed by recent scanning tunneling spectroscopy measurement that the fraction of vortex cores possessing zero-bias peaks decreases with increasing magnetic field on the surface of  $\text{FeTe}_x\text{Se}_{1-x}$ . The hybridization of two Majorana vortex modes cannot simply explain this phenomenon. We construct a three-dimensional tight-binding model simulating the physics of over a hundred Majorana vortex modes in  $\text{FeTe}_x\text{Se}_{1-x}$ . Our simulation shows that the Majorana hybridization and disordered vortex distribution can explain the decreasing fraction of the zero-bias peaks observed in the experiment; the statistics of the energy peaks off zero energy in our Majorana simulation are in agreement with the experiment.

**12:00pm noon**  
**Wednesday, February 19, 2020**  
**Duboc Seminar Room (4-331)**

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Host: Xueda Wen