

**Massachusetts Institute of Technology**  
**Department of Physics**

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## Condensed Matter Theory Seminar

"Hidden spin currents in doped Mott antiferromagnets"

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**Abstract:** We study the nature of doped holes in the Mott insulator by using exact diagonalization and density matrix renormalization group numerical methods. Persistent spin current pattern around a doped hole is found to be concomitant with a nonzero total momentum or angular momentum in the ground state, indicating a novel composite structure of a doped hole. Such anomaly persists for the odd numbers of holes, but the spin current, ground state degeneracy, and charge/spin modulations completely disappear for even numbers of holes, with the ground state exhibiting a d-wave symmetry. An understanding of the spin current is given by a wavefunction description for the one-hole ground state, which reproduces the DMRG/ED results excellently by variational Monte Carlo calculation. Implications to the high- $T_c$  superconductivity and the pseudogap physics will be discussed.

**12:00pm noon**  
**Friday, June 8, 2018**  
**Duboc Room (4-331)**