

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

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**Condensed Matter Theory Seminar**

“Symmetry-Protected Heat Currents and Dissipative Topological Physics”

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**Abstract:** The study of non-equilibrium properties in topological quantum systems is of practical and fundamental importance. Here, we will discuss the physics of a two-dimensional bosonic realization of a topological insulator coupled to two thermal baths in the quantum open-system formalism [1]. We will explain novel phenomena like chiral edge heat currents that are the out-of-equilibrium counterparts of the zero-temperature edge currents. They support a new concept of 'dissipative symmetry-protection', where a set of discrete symmetries protects the heat current differing from the symmetry-protection devised in closed systems and zero-temperature. Remarkably, one of these currents flows opposite to the decreasing external temperature gradient. As the starting point, we will briefly review some basics about the symmetry-protected topological systems in contact with thermal baths, and consider the case of a single thermal reservoir. Actually, this allows us to study prominent results like thermal erasure effects and topological thermal currents. Finally, we will comment about the possibility to experimentally observe these new phenomenology with platforms like photonics chips and optical lattices.

[1] A. Rivas and M. A. Martin-Delgado, Topological Heat Transport and Symmetry-Protected Boson Currents, arXiv:1606.07651

**12:00pm**  
**Tuesday, May 30, 2017**  
**Duboc Room (4-331)**