

Massachusetts Institute of Technology  
Department of Physics

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**Condensed Matter Theory Seminar**

“Viscous and thermal transport in topological phases”

**Barry Bradlyn, Yale University**

**Abstract:** One hallmark of topological phases with broken time reversal symmetry is the appearance of quantized non-dissipative transport coefficients, the archetypical example being the quantized Hall conductivity in quantum Hall states. Here I will talk about two other non-dissipative transport coefficients that appear in such systems - the Hall viscosity and the thermal Hall conductivity. In the first part of the talk, I will start by reviewing previous results concerning the Hall viscosity, including its relation to a topological invariant known as the shift. Next, I will show how the Hall viscosity can be computed from a Kubo formula. For Galilean invariant systems, the Kubo formula implies a relationship between the viscosity and conductivity tensors which may have relevance for experiment. In the second part of the talk, I will discuss the thermal Hall conductivity, its relation to the central charge of the edge theory, and in particular the absence of a bulk contribution to the thermal Hall current. I will do this by constructing a low-energy effective theory in a curved non-relativistic background, allowing for torsion. I will show that the bulk contribution to the thermal current takes the form of an "energy magnetization" current, and hence show that it does not contribute to heat transport.

**12:00noon**

**Tuesday, October 28, 2014**

**Duboc Seminar Room (4-331)**