Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Chiral Floquet Phases of Many-body Localized Bosons"

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Abstract: We construct and classify chiral topological phases in driven (Floquet) systems of strongly interacting bosons (with finite-dimensional site Hilbert spaces) in two spatial dimensions. The construction proceeds by introducing exactly soluble models with chiral edges, which in the presence of many-body localization (MBL) in the bulk are argued to lead to stable chiral phases. These chiral phases do not require any symmetry, and in fact owe their existence to the absence of energy conservation in driven systems. Surprisingly, we show that they are classified by a quantized many-body index, which is well defined for any MBL Floquet system. The value of this index, which is always the logarithm of a positive rational number, can be interpreted as the entropy per Floquet cycle pumped along the edge, formalizing the notion of quantum-information flow. We explicitly compute this index for specific models, and show that the nontrivial topology leads to edge thermalization, which provides an interesting link between bulk topology and chaos at the edge. We also discuss potential experimental realization of the phase using hardcore bosons loaded to a shaken optical lattice.

12:00pm
Tuesday, March 7, 2017
Duboc Room (4-331)

Host: Hiroki Isobe