

Massachusetts Institute of Technology  
Department of Physics

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## Condensed Matter Theory Seminar

“Fractionalization of crystal momentum and other quantum numbers”

Michael Hermele  
University of Colorado, Boulder

**Abstract:** It is a familiar fact that some quantum states of matter have quasiparticle excitations with fractional charge. While this phenomenon is not without subtlety, the meaning of fractional charge is fairly intuitive. It is less obvious what it might mean -- if anything -- to fractionalize quantum numbers of other symmetries, in particular discrete symmetries such as lattice translation.

In this talk, I will explain what it means to fractionalize crystal momentum, and show that this phenomenon has striking consequences accessible to spectroscopic probes. In addition, I will explain how to classify distinct types of quantum number fractionalization in two-dimensional topologically ordered systems, which is a crucial step toward understanding the interplay of symmetry and topological order. Finally, I will describe exactly solvable models illustrating a physical mechanism for fractionalization closely tied to our classification.

**12:00noon**  
**Tuesday, September 30, 2014**  
**Duboc Seminar Room (4-331)**