

Massachusetts Institute of Technology  
Department of Physics

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## Condensed Matter Theory Seminar

"Berry Phase in Composite-Fermi-Liquid States".

**Jie Wang**, Princeton University

**Abstract:** The Composite-Fermi-Liquid (CFL) state is a gapless state that can occur at Landau-level filling  $1/m$  when  $m$  is even, and an emergent Fermi surface for composite fermions forms. We examine the Berry phase associated with moving one composite fermion around different closed paths near the Fermi surface [1,2], using a model wavefunction parameterized by "composite-fermion occupation patterns" that explicitly has a Fermi surface. When these patterns correspond to weakly excited Fermi Sea, they are very accurate approximation for the exact Coulomb-interaction ground states, allowing exact states to be identified with composite-fermion configurations. A many-body analog of the k-space Berry phase is defined and examined both from exact states and from comparison with model wavefunctions by the recently proposed lattice Monte Carlo method. In addition to the phase contributed by density operator, we found a Z2 phase.

[1][arXiv: 1711.07864]

[2][arXiv: 1710.09729]

**12:00pm**  
**Monday, December 18, 2017**  
**Duboc Room (4-331)**

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Host: Max Metlitski