Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

" Geometry of fractional quantum Hall and composite Fermi liquid states"

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Abstract: Fractional quantum Hall (FQH) fluids have an "internal metric" degree of freedom that allows them to minimize their energy when competing geometries (e.g., the band mass and dielectric tensor) are present in the system. In particular, in composite Fermi liquid (CFL) states the internal metric dictates the shape of the Fermi contour, providing a point of contact with experiment. We will present the results of infinite DMRG numerical simulations of the CFL state at filling 1/2 with anisotropic band mass, which show a simple square-root relationship between the Fermi contour anisotropies of composite Fermions and zero-field electrons. This result is in good (and parameter-free) agreement with recent experiments on strained GaAs quantum wells. Going beyond band mass anisotropy, we will discuss the effect of distortions with higher-order (e.g., four-fold) rotational symmetry on the CFL. Finally, we will present a method to numerically extract the internal metric of incompressible FQH states, which lack a Fermi contour. The observed response to band mass anisotropy in this case is well captured by a two-body model of flux attachment.

12:00pm noon
Friday, October 26, 2018
Duboc Room (4-331)

Host: Liang Fu