

MAR17-2016-020218

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Dirac composite fermions in the half-filled Landau level

ROGER MONG, University of Pittsburgh

Recent works have speculated on a possible particle-hole symmetric state in the lowest Landau level at half-filling. Here, we use infinite cylinder DMRG to provide compelling numerical evidence in favour for the theory. We demonstrate the existence of a Fermi surface of composite fermions for realistic interactions between electrons at half-filling. Using both theoretical and numerical arguments, we find that the composite fermions are massless Dirac particles, at finite density, similar to the surface state of a 3D topological insulator. Exploiting this analogy we devise a numerical test and successfully observe the suppression of $2k_F$ backscattering characteristic of Dirac particles.