

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Composite Fermi surface in the half-filled Landau level with anisotropic electron mass¹ MATTEO IPPOLITI, SCOTT GERAEDTS, RAVINDRA BHATT, Princeton University — We study the problem of interacting electrons in the lowest Landau level at half filling in the quantum Hall regime, when the electron dispersion is given by an anisotropic mass tensor. Based on experimental observations² and theoretical arguments³, the ground state of the system is expected to consist of composite Fermions filling an elliptical Fermi sea, with the anisotropy of the ellipse determined by the competing effects of the isotropic Coulomb interaction and anisotropic electron mass tensor. We test this idea quantitatively by using a numerical density matrix renormalization group method for quantum Hall systems on an infinitely long cylinder⁴. Singularities in the structure factor allow us to map the Fermi surface of the composite Fermions⁵. We compute the composite Fermi surface anisotropy for several values of the electron mass anisotropy which allow us to deduce the functional dependence of the former on the latter.

¹This research was supported by Department of Energy Office of Basic Energy Sciences through Grant No. DE-SC0002140.

²D. A. Kamburov et al., Phys. Rev. B 89, 085304 (2014)

³K. Yang, Phys. Rev. B 88, 241105 (2013)

⁴M. P. Zaletel et al., Phys. Rev. B 91, 045115 (2015)

⁵S. D. Geraedts et al., Science 352 (6282), 197 (2016)

Matteo Ippoliti
Princeton University

Date submitted: 10 Nov 2016

Electronic form version 1.4