In-plane Field Tuned Subband Quantum Hall Ferromagnetism

DAGIM TILAHUN, ALLAN MACDONALD — Motivated by the recent experimental work of Guo et al. (Phys. Rev. B 78, 233305 (2008)), we study the effects of an in-plane magnetic field on quantum Hall states in which subband, Landau level, and spin degrees of freedom compete. We find that the phase diagram identified by these authors can be explained qualitatively by using only single-electron properties, whereas the energy gap behavior can be explained only by considering electron-electron interactions. We predict a series of in-plane field tuned first order phase transitions in high-mobility samples.