Spin Transition of Composite Fermion Solids in Wide Quantum Wells Observed with Microwave Spectroscopy

ANTHONY HATKE, LLOYD ENGEL, National High Magnetic Field Laboratory, YANG LIU, MAN-SOUR SHAYEGAN, LOREN PFEIFFER, KEN WEST, KIRK BALDWIN, Princeton University — Within a narrow range of Landau filling ($\nu$) near 1, a resonance in the microwave spectrum in high mobility two-dimensional electron systems is known to occur [1]. The resonance is understood as due to a pinning mode of a Wigner solid of quasicarriers and is present in the $\nu$-region of vanishing diagonal resistance. In microwave spectroscopy an abrupt jump in the resonance frequency, $f_{pk}$, upon decreasing $\nu$ from 1 was observed in wide quantum wells [2]. This jump was interpreted as a transition between two solid states: S1, which occurred closer to $\nu = 1$, and S2 (with enhanced-$f_{pk}$), which occurred farther from $\nu = 1$. In this talk we discuss microwave measurements using variable carrier density and in plane magnetic field. Typical for a spin-related transition, tilting the sample at fixed $n$ results in effects similar to those found on increasing $n$ without tilt. Taken together, the dependencies of the resonance on $n$ and the tilt angle are consistent with a ground state spin transition between different solids. We discuss our results in terms of interacting two-flux composite fermions. [1] Chen et al., Phys. Rev. Lett. 93, 206805 (2004). [2] Hatke et al., Nat. Commun. 5, 4154 (2014).

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