Prediction of a non-Abelian fractional quantum Hall state with *f*-wave pairing of composite fermions in wide quantum wells

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At filling factor ¼ in GaAs quantum wells, a transition between a compressible and incompressible state is observed as the electron density is increased. We theoretically calculate the phase diagram as a function of the quantum well width and electron density. We find that as the well width and/or electron density are increased there is a transition from a composite fermion Fermi sea into a novel non-Abelian fractional quantum Hall state in the same topological class as an *f*- wave pairing of composite fermions. Additionally, we provide experimental signatures in the form of quantum point contact tunneling exponents and thermal Hall coefficients to distinguish the topological nature of the ground state.