

Abstract Submitted
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Re-emergence of the electron in a fractional quantum Hall fluid

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— The low energy physics of the fractional quantum Hall fluid is described in terms of fermionic quasiparticles called composite fermions, which are distinct from electrons. We show that a long lived electron- like quasiparticle also exists in the excitation spectrum. Specifically, we find, using wave functions that are demonstrably very accurate for small systems, that there is a non-zero overlap (in the thermodynamic limit) between the state obtained by application of an electron creation operator to a fractional quantum Hall ground state and a high energy bound state complex containing an odd number of composite-fermion quasiparticles. The electron annihilation operator similarly couples to a bound complex of composite-fermion holes. We predict that these bound states can be observed through a conductance resonance in experiments involving a tunneling of an electron into a quantum Hall fluid.

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