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Composite-fermion antiparticle description of the hole excitation in the maximum-density droplet ALEV DEVRIM GUCLU, Cornell University, GUN SANG JEON, Pennsylvania State University, CYRUS J. UMRIGAR, Cornell University, JAINENDRA K. JAIN, Pennsylvania State University — The maximum-density droplet of quantum dots is a finite-size realization of the state at filling factor one. For a sufficiently small number of electrons, it becomes unstable to the creation of a central hole as the magnetic field is increased or the strength of the confinement potential reduced. The simplest model for the hole is a vortex at the center, which, however, is renormalized by edge excitations. We show that a remarkably accurate description of the actual hole state is achieved in terms of a "composite-fermion antiparticle," which is surprising in view of the fact that composite fermions are thought to be relevant only in the fractional Hall regime. The composite-fermion antiparticle description also allows us to study the effect of Landau level mixing through variational and diffusion Monte Carlo calculations in a very efficient manner. Generalizations to systems containing several holes, as well as to the quasiholes of fractional quantum Hall states are presented.

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