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Green's Function Monte Carlo Study of Two-Dimensional Quantum Dots KENNETH GRAHAM, JAMES ANDERSON, JAINENDRA JAIN, Pennsylvania State University — Two-dimensional quantum dots of interacting electrons in zero magnetic field have been studied with various Monte Carlo methods for some time. To our knowledge, however, Green's function Monte Carlo (GFMC) has not been used. We show that GFMC is a useful method of calculating the ground state of these quantum dot systems. We calculate ground state energies for two and four electrons using a weighted average of a trial wave function's local energy, $(\hat{\mathrm{H}}\Psi_T)/\Psi_T$. Our trial wave function Ψ_T uses a two-body (electron-electron) Jastrow function to incorporate correlations between electrons and is variance-minimized. The GFMC method used is an exact-cancellation method which locates the nodes of the true ground state wave function. This method is in principle "exact," outside of a statistical error common to all Monte Carlo methods. The energies obtained are slightly lower than those of earlier diffusion and variational Monte Carlo work.

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