Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Configuration Space Renormalization (CSR): a study of fractional quantization of charge in a dual-edge fractional quantum Hall system. EUGENE TSIPER, George Mason University and Naval Research Lab, Washington DC — A renormalization procedure is designed to find a subspace of high relevance in a many-body Hilbert space. Substantial reduction in the basis size can be achieved while approaching the exact diagonalization results. The idea is to search for a set of many-particle configurations that contribute the largest weight to the exact solution of the many-body Schrödinger equation, without actually computing the exact solution. We start with some suitable set of K configurations and find the ground state of the Hamiltonian in the many-body subspace that they span. We then retain $K' < K$ configurations by discarding the ones which have little weight. We then re-expand our set with the new configurations that have large matrix elements with those retained. When repeated, the procedure converges after several iterations and yields some optimal set of configurations. The resulting truncation of the Hilbert space is essentially many-body, and cannot be achieved by truncating or rotating the single-particle basis. I will discuss an application of CSR to model resonant tunneling between the edges in the fractional quantum Hall regime, which has been used to experimentally observe fractional quantization of electric charge. Clusters large enough to contain two unconnected edges are modeled. The results suggest fractional quantization of the quasiparticle charge in units of $e/3$ and $e/5$ at fillings 1/3 and 2/5.

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Date submitted: 30 Nov 2005 Electronic form version 1.4