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Incompressible Quantum Liquids and New Conservation Laws ALEXANDER SEIDEL, HENRY FU, DUNG-HAI LEE, JOEL MOORE, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, JON MAGNE LEINAAS, Department of Physics, University of Oslo, P.O. Box 1048 Blindern, 0316 Oslo, Norway — We discuss a class of Hamiltonians which, in addition to the usual center-of-mass (CM) momentum conservation, also have center-of-mass position conservation. We find that regardless of the particle statistics, the energy spectrum is at least q-fold degenerate when the filling factor is p/q, where p and q are coprime integers. Interestingly, the simplest form of Hamiltonian respecting this type of symmetry encapsulates two prominent examples of novel states of matter, namely the fractional quantum Hall liquid and the quantum dimer liquid. We explore the connection to the Hall liquid in some detail, and also discuss the possible relevance of this class of Hamiltonian to the search for featureless Mott insulators.

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