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Compressible and incompressible phases in lattice fractional quantum Hall systems[1] SHUO YANG, KAI SUN, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, MD 20742 — We study lattice fractional quantum Hall (FQH) systems in the presence of local potential traps using the exact diagonalization technique. By implementing an array of local potential traps, we show that the system undergoes a series of phase transitions. As the strength of potential traps is increased, the FQH state turns into a compressible metallic state, and then into a topologically trivial insulator. We present the phase diagram as well as convincing numerical evidences which we use to identify these phases and phase transitions, including the energy spectrum, the fidelity metric, the Chern number, and the entanglement spectrum. In addition, we also compare the topological trivial insulator observed in our systems with Anderson insulators, which are expected in ordinary fractional quantum Hall systems in 2D electron gases in the presence of strong impurities.

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