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Fractionalization via Z_2 Gauge Fields at a Cold Atom Quantum Hall Transition YAFIS BARLAS, KUN YANG, National High Magnetic Field Laboratory — We study a single species of fermionic atoms in an "effective" magnetic field at total filling factor $\nu_f = 1$, interacting through a p-wave Feshbach resonance, and show that the system undergoes a quantum phase transition from a $\nu_f = 1$ fermionic integer Quantum Hall state to $\nu_b = 1/4$ bosonic fractional Hall state as a function of detuning. The transition is in the $(2 + 1)$D-Ising universality class. We formulate a dual theory in terms of quasiparticles interacting with a Z_2 gauge field, and show that charge fractionalization follows from this topological quantum phase transition. The resultant effective theory contains the lattice Z_2 gauge theory action along with a "Hopf" term which encodes the quasiparticle statistics. The transition occurs in the Z_2 sector and is a confinement-deconfinement transition for the quasiparticles.

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