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Z_2 fractional topological insulators in two dimensions CECILE REPELLIN, Laboratoire Pierre Aigrain, ENS and CNRS, 24 rue Lhomond, 75005 Paris, France, ANDREI BERNEVIG, Department of Physics, Princeton University, Princeton, NJ 08544, NICOLAS REGNAULT, Department of Physics, Princeton University, Princeton, NJ 08544 and Laboratoire Pierre Aigrain, ENS and CNRS, 24 rue Lhomond, 75005 Paris, France — The simplest example of a two dimensional fractional topological insulator (FTI) consists of two decoupled copies of a Laughlin state with opposite chiralities. Using a simple microscopic model at half filling, we study the stability of this type of FTI phase upon addition of two coupling terms of different nature: a Rashba term, and an interspin interaction term. Using exact diagonalization and entanglement spectrums, we numerically show that the FTI phase survives significant amplitudes of both the band structure and the interaction coupling terms, at different system sizes. We compare our system to a similar two component fractional Chern insulator. Our study shows that the time reversal invariant system survives the introduction of interaction coupling on a much larger scale than the time reversal symmetry breaking one, stressing the importance of time reversal symmetry in the FTI phase stability.

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