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Interacting anyons in one dimension: The Fibonacci chain ANDREAS LUDWIG, UC Santa Barbara, ADRIAN FEIGUIN, SIMON TREBST, Microsoft Research, Station Q, MATTHIAS TROYER, ETH Zurich, ALEXEI KITAEV, ZHENGHAN WANG, MICHAEL FREEDMAN, Microsoft Research, Station Q — We discuss generalizations of quantum spin chains using anyonic degrees of freedom. The simplest model for interacting anyons in one dimension is closely related to the Fibonacci topological quantum field theory. The Hamiltonian favors neighboring anyons to fuse into the trivial channel, similar to the quantum Heisenberg spin chain favoring neighboring spins to form spin singlets. Numerical simulations show that the model is critical with a dynamical critical exponent z=1. It is described by a conformal field theory with central charge c=7/10. An exact solution of this model is given by mapping to a Temperley-Lieb algebra. We discuss the excitation spectra for finite systems, and generalizations to dimerized chains and ladders.

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