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Topological Phases of a Su-Schrieffer-Heeger ladder system SURAJ HEGDE, KARMELA PADAVIC, Univ of Illinois - Urbana, WADE DE-GOTTARDI, Joint Quantum Institute, University of Maryland, College Park, SMITHA VISHVESHWARA, Univ of Illinois - Urbana — We study a ladder system whose legs are comprised of two Su-Schrieffer-Heeger (SSH) dimer chains. The parameters are chosen so that the system exhibits particle-hole symmetry and has a Z x Z topological invariant. In the parameter space of the ladder system, we employ a transfer matrix approach to chart out the topological phase diagram identifying two distinct topological phases and a trivial phase. Each topological phase is marked by the existence of two zero energy edge-modes on either the top or bottom legs of the ladder. We consider the effect of disorder and (quasi-)periodicity on the system; in the latter case, we show that the phase diagram is reminiscent of Hofstadter's butterfly diagram. In addition, we consider the effect of finite size on the edge-mode wave functions, the lifting of degeneracy of the zero modes and the phase boundaries. We briefly discuss the realization of the SSH ladder system in cold atomic systems and its connections to Majorana wires.

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