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Topological phase transitions of interacting Majorana fermions in an array of vortices JIANSHENG WU, South University of Science and Technology of China, Shenzhen, China, HSIANG-HSUAN HUNG, University of Texas at Austin, Austin, Texas 78712-1192, USA, CHING-KAI CHIU, University of British Columbia, Vancouver, British Columbia, Canada V6T 1Z1, KUEI SUN, The University of Texas at Dallas, Richardson, Taxes 75080-3021, USA — We study a vortex array in a p-wave superconducting thin film that produces ladder-like lattices with interacting Majorana fermions. We construct a model Hamiltonian with parameters which are tunable via the deformation of the vortex array. We explore topological phase transitions of the system and compute phase diagrams using the density-matrix-renormalization-group method. We further investigate transport properties for experimental detection. Our results have potential application on building devices to engineer strongly correlated Majorana fermions.

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