

Abstract Submitted
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From Topological Insulator to Topological Superfluid¹ XIONG-JUN LIU, Institute of Advanced Study and Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, K.T. LAW, T.K. NG, Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong — Majorana zero bound state exists in the vortex core of a chiral p+ip superconductor (SC), which can be driven from an s-wave SC by spin-orbit (SO) coupling. In cold atoms, an s-wave superfluid (SF) can be obtained by Feshbach resonance. Together with the Rashba SO interaction and Zeeman field, the s-wave SF gives rise to a chiral topological SF. However, a Rashba-type SO interaction is not experimentally realistic for cold atom gas. We propose here a novel scheme to study exotic topological phases in an optical lattice, where we can observe both the topological insulating phase and chiral topological SF under different parameter regimes. We examine in detail our prediction with realistic experimental platforms, and show its great feasibility in the experimental realization.

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