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Topology, edge states, and zero-energy states of ultracold fermionic atoms in 1D optical superlattices CHIH-CHUN CHIEN, Univ of California - Merced, YAN HE, Sichuan University, China, KEVIN WRIGHT, Dartmouth College, SAID KOUACHI, Quassim University, Saudi Arabia — Recent advance in generating optical superlattices offers opportunities for exploring interesting band structures. The simplest, dimerized superlattice is known to be a topological insulator when modeled as the Su-Schrieffer-Heeger model. By generalizing the modulation of onsite potential and hopping coefficient to higher periods, more topological and geometrical properties can emerge in superlattices. We show that a 1D optical superlattice with modulating onsite potentials can have nonzero Chern numbers, and the bulk-boundary correspondence leads to localized edge states. We show possibilities of assembling two superlattices with different topologies into a ring, and two internal boundaries with localized edge states can be generated. In the presence of modulating hopping coefficients, there are symmetry-related modes showing localization or zero-energy. Selected schemes for measuring those special states by depleting the mobile particles away from the boundary or probing the local density of states will also be discussed. Reference: Y. He, K. Wright, S. Kouachi, and C. C. Chien, arXiv: 1712.06538.

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