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Robust Weyl points in 1D superlattices with transverse spin-orbit coupling[1] XI-WANG LUO, CHUANWEI ZHANG, University of Texas at Dallas — Weyl points, synthetic magnetic monopoles in the 3D momentum space, are the key features of topological Weyl semimetals, which have been proposed to exist in cold-atom systems with spin-orbit coupling (SOC). Previous schemes usually rely on high-dimensional SOC requiring complex laser configurations and precise control of laser parameters. Here we propose that robust Wely points can be obtained using 1D triple-well superlattices (a spin-1/three-band system) with only 2D transverse SOC realized by Raman-assisted tunnelings. The presence of a third band is responsible to the robustness of the Weyl points against system parameters (e.g., Raman laser polarization, phase, incident angle, etc.). Different with a spin-1/2 system, the non-trivial topology of Weyl points in such spin-1 system is characterized by both the spin vector and tensor textures, which can be probed using momentum-resolved Rabi spectroscopy. Our proposal provide a simple yet powerful platform for exploring Weyl physics and related high-dimensional topological phenomena using high-spin ultracold atoms.

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