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Raman-induced Spin-Orbit Coupling in Optical Superlattices JUNRU LI, WUJIE HUANG, BORIS SHTEYNAS, SEAN BURCHESKY, FURKAN TOP, ALAN JAMISON, WOLFGANG KETTERLE, Massachusetts Inst of Tech-MIT — We demonstrate a new scheme for spin-orbit coupling (SOC) of ultracold atoms. Instead of internal (hyperfine) states, two lowest bands in an optical superlattice were used as pseudospins. A Raman process was implemented to provide coupling between pseudospin and momentum. With single internal state and far-detuned beams used, our new scheme will allow convenient generalisation to a wide range of atoms. Pseudospin interaction is tuneable by controlling the superlattice, allowing us to study many-body phenomena in SOC systems such as the stripe phase.

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