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Spin-orbit coupling in a Bose-Fermi spinor Mixture CHUANZHOU ZHU, Rice University, LI CHEN, Shanxi University, HUI HU, XIA-JI LIU, Swinburne University of Technology, HAN PU, Rice University — We consider a mixture of spin-1/2 bosons and fermions, where only the bosons are subjected to the spin-orbit coupling induced by Raman beams. The fermions, although not directly coupled to the Raman lasers, acquire an effective spin-orbit coupling through the spin-exchange interaction between the two species. Our calculation shows that this is a promising way of obtaining spin-orbit coupled Fermi gas without Raman-induced heating, which can lead to topological bands and/or topological fermionic superfluid. Furthermore, the presence of fermions have a striking effect on the stripe phase of the bosons — the spatial period of the bosonic density stripes can be greatly increased which makes this phase easily observable in experiment. This system provides a new platform, not available in solid state materials, to study the physics of spin-orbit coupling.

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