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BEC in Spin-orbit Coupled Optical Lattices: Flat Band and Instability¹ CHUANWEI ZHANG, YONGPING ZHANG, Department of Physics and Astronomy, Washington State University, Pullman, WA 99164 — We investigate the dynamics of a Bose-Einstein condensate (BEC) in the presence of spin-orbit coupling and a one dimensional optical lattice. We show that the combination of the experimentally already realized spin-orbit coupling and the optical lattice potential yields a flat ground state Bloch energy band. The dynamical and Landau instabilities of the BEC in the spin-orbit coupled optical lattice are also investigated.

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