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Cavity-assisted spin-orbit coupling in cold atoms CHUANZHOU ZHU, LIN DONG, HAN PU, Rice University — We investigate dynamical and static properties of ultracold atoms confined in an optical cavity, where two photon Raman process induces effective coupling between atom's pseudo-spin and center-of-mass momentum. In the meantime, atomic dynamics exerts a back action to cavity photons. We adopt both mean field and master equation approach to tackle the problem and found surprising modifications to atomic dispersions and dynamical instabilities, arising from the intrinsic nonlinearity of the system. Correspondence between semi-classical and quantum limits is analyzed as well.

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