Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Cavity-Induced Spin-Orbit Coupling in Cold Atoms CHUANZHOU ZHU, LIN DONG, HAN PU, Rice University — We consider a single ultracold atom trapped inside a single-mode optical cavity, where a two-photon Raman process induces an effective coupling between atom's pseudo-spin and external center-of-mass (COM) motion. Without the COM motion, this system is described by the Jaynes-Cummings (JC) model. We show how the atomic COM motion dramatically modifies the predictions based on the JC model, and how the cavity photon field affects the properties of spin-orbit coupled system. We take a quantum Master equation approach to investigate the situation when the cavity pumping and decay are taken into account.

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Date submitted: 26 Jan 2016 Electronic form version 1.4