Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Spin exchange-induced spin-orbit coupling in a superfluid mixture[1] CHUANZHOU ZHU, Rice University, LI CHEN, Shanxi University, HAN PU, Rice University — We investigate the ground-state properties of a dual-species spin-1/2 Bose-Einstein condensate. One of the species is subjected to a pair of Raman laser beams that induces spin-orbit (SO) coupling, whereas the other species is not coupled to the Raman laser. In certain limits, analytical results can be obtained. It is clearly shown that, through the inter-species spin-exchange interaction, the second species also exhibits SO coupling. This mixture system displays a very rich phase diagram, with many of the phases not present in an SO coupled single-species condensate. Our work provides a new way of creating SO coupling in atomic quantum gases, and opens up a new avenue of research in SO coupled superfluid mixtures. From a practical point of view, the spin exchange-induced SO coupling may overcome the heating issue for certain atomic species when subjected to the Raman beams.

[1]US NSF and the Welch Foundation (Grant No. C-1669)

Chuanzhou Zhu
Rice University

Date submitted: 18 Jan 2018 Electronic form version 1.4