Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Finite-Momentum Dimer Bound State in Spin-Orbit Coupled Fermi Gas[1] LIN DONG, Rice University, LEI JIANG, Joint Quantum Institute, University of Maryland and National Institute of Standards and Technology, HUI HU, ARC Centre of Excellence for Quantum-Atom Optics, Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, HAN PU, Rice University — We investigate the two-body properties of a spin-1/2 Fermi gas subject to a spin-orbit coupling induced by laser fields. When attractive s-wave interaction between unlike spins is present, the system may form a dimer bound state. Surprisingly, under proper conditions, the bound state obtains finite center-of-mass momentum, whereas under the same condition but in the absence of the two-body interaction, the system has zero total momentum. This unusual result can be regarded as a consequence of the broken Galilean invariance by the spin-orbit coupling. Such a finite-momentum bound state will have profound effects on the many-body properties of the system.

[1]HP is supported by the NSF, the Welch Foundation (Grant No. C-1669), and DARPA. HH is supported by the ARC Discovery Projects (Grant No. DP0984522) and the National Basic Research Program of China (NFRP-China, Grant No. 2011CB921502).

Lin Dong
Rice University

Date submitted: 05 Nov 2012 Electronic form version 1.4