Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

Route to Observable Fulde-Ferrell-Larkin-Ovchinnikov Phases in 3D Spin-Orbit Coupled Degenerate Fermi Gases[1] CHUANWEI ZHANG, MING GONG, Department of Physics, the University of Texas at Dallas, Richardson, TX, 75080 USA, ZHEN ZHENG, XUBO ZHOU, GUANGCAN GUO, Key Laboratory of Quantum Information, University of Science and Technology of China, Hefei, Anhui, 230026, People's Republic of China — The Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase, a superconducting state with non-zero total momentum Cooper pairs in a large magnetic field, was first predicted about 50 years ago, and since then became an important concept in many branches of physics. In recent years, the possibility of observing FFLO states using ultracold degenerate Fermi gases has sparked tremendous interest. However, unambiguous experimental evidence for FFLO states is still elusive because of the stringent parameter requirement in experiments. In this Letter, we show that a giant parameter region for FFLO states can be obtained in 3D degenerate Fermi gases in the presence of spin-orbit coupling and an in-plane Zeeman field, two ingredients that were already developed for cold atoms in recent experiments. The predicted FFLO state is stable against quantum fluctuations due to the 3D geometry, and can be observed with experimentally already achieved temperature (T 0.05E_F).

[1]M.G. and C.Z. are supported by ARO (W911NF-12-1-0334), DARPA-YFA (N66001-10-1-4025), AFOSR (FA9550-11- 1-0313), and NSF-PHY (1104546).

Chuanwei Zhang
Department of Physics, the University of Texas at Dallas,
Richardson, TX, 75080 USA

Date submitted: 21 Sep 2012 Electronic form version 1.4