Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Probing non-Abelian statistics of Majorana fermions in ultracold atomic superfluid SHI-LIANG ZHU, School of Physics, South China Normal University, L.B. SHAO, Z.D. WANG, Department of Physics, The University of Hong Kong, LU-MING DUAN, Department of Physics, Michigan University — We propose an experiment to directly probe the non-Abelian statistics of Majorana fermions by braiding them in an s-wave superfluid of ultracold atoms. We show different orders of braiding operations give orthogonal output states that can be distinguished through Raman spectroscopy. Realization of Majorana bound states in an s-wave superfluid requires strong spin-orbital coupling and a controllable Zeeman field in the perpendicular direction. We present a simple laser configuration to generate the artificial spin-orbital coupling and the required Zeeman field in the dark state subspace.

Shi-Liang Zhu
School of Physics, South China Normal University

Date submitted: 02 Nov 2010 Electronic form version 1.4