Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Non-Abelian states in Fractional Quantum Hall effect in charge carrier hole systems[1] GEORGE SIMION, YULI LYANDA-GELLER, Department of Physics and Astronomy, Purdue University — Quasiparticle excitations obeying non-Abelian statistics represent the key element of topological quantum computing. Crossing of levels and strong coupling between angular momentum and orbital motion, described by Luttinger Hamiltonian, make properties of charge carrier holes different from those of electrons. Peculiarities of hole spectrum in magnetic field provide an opportunity for controlling Landau level mixing in charge carier hole systems. In order to describe Fractional Quantum Hall effect for holes, we propose a method to map hole spectrum and wavefunctions using a spherical shell. We investigate the experimentally observed $\nu = 1/2$ state in spherical geometry. Haldane pseudopotentials are computed and the effect of Landau level mixing is evaluated. Exact diagonalization of Coulomb interaction in systems with eight to fourteen holes is performed. We determine that the ground state superposition with Abelian 331 state is very small and the overlap with Moore-Read state is significant. The quasihole and quasielectron excitations are discussed.

[1]Research was supported by the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering under Award DE-SC0010544.

George Simion
Department of Physics and Astronomy, Purdue University

Date submitted: 05 Nov 2015 Electronic form version 1.4