Abstract Submitted
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Particle Hole Symmetry Breaking In the Fractional Quantum Hall Effect at $\nu = \frac{5}{2}$[1] WILLIAM D. HUTZEL, JOHN J. MCCORD, Department of Physics and Astronomy, California State University Long Beach, Long Beach, California 90840, USA, BEN STERN, P. RAUM, Department of Physics, Virginia Tech, Blacksburg, Virginia 24061, USA, HAO WANG, Department of Physics, Southern University of Science and Technology, Shenzen 518055, China, V. W. SCAROLA, Department of Physics, Virginia Tech, Blacksburg, Virginia 24061, USA, MICHAEL R. PETERSON, Department of Physics and Astronomy, California State University Long Beach, Long Beach, California 90840, USA — The fractional quantum Hall effect (FQHE) is widely studied because of its exotic topological phases. The FQHE at $\nu = \frac{5}{2}$ is interesting because it supports excitations of non-abelian quasiparticles. These non-abelian particles are one possible candidate for use as qubits in topological quantum computations. The leading theoretical description of the FQHE at $\nu = \frac{5}{2}$ is the Moore-Reed Pfaffian and its particle hole conjugate the anti-Pfaffian. The Pfaffian and the anti-Pfaffian are the exact ground states of a three body Hamiltonian (H_3) and its particle hole conjugate (H_3'), respectively. The Pfaffian breaks particle hole symmetry (PHS) explicitly while the physical interaction (Coulomb) is largely PHS. We define a PHS Hamiltonian (H_2) and ask is PHS breaking necessary in order to produce a Pfaffian ground state? To answer, we study $H(\alpha) = (1-\alpha)H_3 + \alpha H_2$ and tune alpha from 0 to 1. We show that the ground and low energy states for H_2 and H_3 remain adiabatically connected. This adiabatic connection shows the low energy states for H_2 and H_3 are in the same universality class.

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