

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Competing states for the fractional quantum Hall effect in the 1/3-filled second Landau level JAE-SEUNG JEONG, Institute for Basic Science:Center for Correlated Electron Systems, Department of Physics Astronomy, Seoul National University, Seoul 08826, Korea, HANTAO LU, Center for Interdisciplinary Studies Key Laboratory for Magnetism and Magnetic Materials of the MoE, Lanzhou University, Lanzhou 730000, China, KENJI HASHIMOTO, Max Planck Institute for Mathematics Vivatsgasse 7, 53111 Bonn, Germany, SUK BUM CHUNG, Institute for Basic Science : Center for Correlated Electron Systems, Department of Physics Astronomy, Seoul National University, Seoul 08826, Korea, KWON PARK, School of Physics, Korea Institute for Advanced Study, Seoul 130-722, Korea — We study the nature of the fractional quantum Hall state in the 1/3-filled second Landau level at filling factor $7/3$ via exact diagonalization. We show a series of transitions in the energy spectrum from a Laughlin-type spectrum, to an intermediate compressible spectrum, to a reentrant incompressible spectrum, and to a compressible spectrum with decrease of the Haldane pseudopotential. To search for a trial state describing the $7/3$ state, we compute the overlap of the exact $7/3$ ground state with various competing states including the Laughlin state, the particle-hole conjugate of the Z_4 parafermion state, the fermionic Haffnian state, the antisymmetrized product state of two composite fermion seas (CFSs) at $1/6$ filling, and the antisymmetrized correlated state of two CFSs at $1/4$ filling, which are obtained as an antisymmetrized projection of the bilayer quantum Hall states. Specifically, we prove that the fermionic Haffnian state is equivalent to the antisymmetrized projection of the Halperin (551) state.

Jae-Seung Jeong
Institute for Basic Science : Center for Correlated Electron Systems, Department of Physics
Astronomy, Seoul National University, Seoul 08826, Korea

Date submitted: 06 Nov 2015

Electronic form version 1.4