

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Polarized Fractional Quantum Hall States at  $1/3$  and  $5/2$  Filling: a Density-Matrix Renormalization Group Calculation** JIZE ZHAO, DONNA SHENG, Department of Physics and Astronomy, California State University, Northridge, California 91330, USA, F. DUNCAN M. HALDANE, Department of Physics, Princeton University, Princeton, NJ 08544 — In this talk, the density-matrix renormalization group method is employed to investigate the fractional quantum Hall effect (FQHE) at filling numbers  $\nu = 1/3$  and  $5/2$ . We present benchmark results for both filling numbers for larger system sizes to show the accuracy as well as the capacity of our numerical algorithm. Furthermore, we demonstrate that by keeping a large number of states, one can also obtain reliable entanglement spectrum at  $\nu = 5/2$ , which characterizes the topological properties of FQHE states. Based on a finite-size scaling analysis, we also confirm that the entanglement gap defined by Li and Haldane for  $\nu = 5/2$  state with Coulomb interaction remains finite in the thermodynamic limit.

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Date submitted: 26 Nov 2010

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