Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Bipartite fluctuations and entanglement spectrum in quantum Hall states ALEXANDRU PETRESCU, Yale University and CPHT Ecole Polytechnique France, H. FRANCIS SONG, New York University, STEPHAN RACHEL , Institute for Theoretical Physics, TU Dresden, 01062 Dresden, Germany, ZORAN RISTIVOJEVIC, CPHT Ecole Polytechnique, France, CHRISTIAN FLINDT, University of Geneva, Department of Theoretical Physics, NICOLAS LAFLORENCIE, LPT Toulouse and CNRS, France, ISRAEL KLICH, University of Virginia, Charlottesville, NICOLAS REGNAULT, Princeton University and LPA ENS Paris, KARYN LE HUR, CPHT Ecole Polytechnique and CNRS, France — We exploit a general relation between bipartite fluctuations of particle number or spin and the real space bipartite entanglement entropy and the entanglement Rényi entropies for free fermion systems [Phys. Rev. B **85**, 035409 (2012)]. We apply this method to derive the real space entanglement entropy and entanglement spectrum [Phys. Rev. Lett. **101**, 010504 (2008)] of integer quantum Hall systems and Chern insulators, focusing on continuum models, edge models at quantum point contacts and the role of sine-Gordon terms, and finite-sized lattice models. Numerical efforts will be addressed for fractional quantum Hall systems.

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Date submitted: 15 Nov 2013 Electronic form version 1.4