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New Method for Studying Localization effects in Quantum Hall Systems R. N. BHATT, SCOTT GERAEDTS, Department of Electrical Engineering, Princeton University, Princeton, NJ 08544 — Disorder is central to the study of the fractional quantum Hall effect. It is responsible for the finite width of the quantum Hall plateaus, and it is of course present in experiment. Numerical studies of the disordered fractional quantum Hall effect are nonetheless very difficult, because the lack of symmetry present in clean systems limits the size of systems that can be studied [1,2]. We introduce a new method for studying the integer and fractional quantum Hall effect in the presence of disorder that allows larger system sizes to be studied. The method relies on truncating the single particle Hilbert space, which leads to an exponential reduction in the Hilbert space of the many-particle system while preserving the essential topological nature of the state. We apply the model to the study of disorder transitions in the quantum Hall effect, both for the ground state and excited states. This work was supported by the US Department of Energy, Office of Basic Energy Sciences, through Grant DE-SC0002140. [1] D. N. Sheng, Xin Wan, E. H. Rezayi, Kun Yang, R. N. Bhatt and F. D. M. Haldane, Physical Review Letters 90, 256802 (2003) [2] Xin Wan, D. N. Sheng, E. H. Rezayi, Kun Yang, R. N. Bhatt and F. D. M. Haldane, Physical Review B 72, 075325 (2005).

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