

Abstract Submitted  
for the MAR12 Meeting of  
The American Physical Society

**Quantum Hall effect in a one-dimensional dynamical system**<sup>1</sup> JONATHAN EDGE, JAN DAHLHAUS, Leiden University, JAKUB TWORZYDLO, University of Warsaw, CARLO BEENAKKER, Leiden University — We construct a periodically time-dependent Hamiltonian with a phase transition in the quantum Hall universality class [1]. This Hamiltonian is closely related to that of a discrete time quantum walker, but additionally it allows us to study effects of disorder. A particular choice for the form of the Hamiltonian enables us to determine the time evolution of the system in one of the dimensions exactly. Simulations of the system can thus be performed in one dimension, thereby reducing the computational effort required. We investigate the topological phase transition associated with tuning between different quantum Hall plateaux and determine the critical exponent for the divergence of the localisation length. Our scheme can in principle also be implemented in cold atoms experiments, opening the doors to investigating the quantum Hall phase transition in a one-dimensional cold atoms set up.

[1] J. P. and Edge, J. M. and Tworzydlo, J. and Beenakker, C. W. J., PRB 84 115133 (2011).

<sup>1</sup>European Early stage researcher grant.

Jonathan Edg  
Leiden University

Date submitted: 26 Nov 2011

Electronic form version 1.4