Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Reservoir induced topological order and quantized charge pumps in open lattice models with interactions DOMINIK LINZNER, MALTE KOSTER, Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern, 67663 Kaiserslautern, Germany, FABIAN GRUSDT, Department of Physics, Harvard University, Cambridge, Massachusetts 02138, USA, MICHAEL FLEISCHHAUER, Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern, 67663 Kaiserslautern, Germany — Since the discovery of the quantum Hall effect, topological states of matter have attracted the attention of scientists in many fields of physics. By now there is a rather good understanding of topological order in closed, non-interacting systems. In contrast the extension to open systems in particular with interactions is entirely in its infancy. Recently there have been advances in characterizing topology in reservoir driven systems without interactions, but the topological invariants introduced lack a clear physical interpretation and are restricted to non-interacting systems. We consider a one-dimensional interacting topological system whose dynamics is entirely driven by reservoir couplings. By slowly tuning these couplings periodically in time we realize an open-system analogue of the Thouless charge pump that proves to be robust against unitary and non-unitary perturbations. Making use of this Thouless pump we introduce a topological invariant, which is applicable to interacting systems. Finally we propose a conceptual detection scheme that translates the open-system topological invariant into the context of a well understood closed system.

Dom
Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern, 67663 Kaiserslaute

Date submitted: 26 Jan 2016 Electronic form version 1.4