Abstract Submitted for the DAMOP15 Meeting of The American Physical Society

Topological order in interacting one-dimensional Bose Systems¹ FABIAN GRUSDT, MICHAEL HÖNING, MICHAEL FLEISCHHAUER, University of Kaiserslautern — We discuss topological aspects of one-dimensional inversionsymmetric systems of interacting bosons, which can be implemented in current experiments with ultra cold atoms. We consider both integer and fractional fillings of a topologically non-trivial Bloch band. Our starting point is the chiral-symmetric Su-Schrieffer-Heeger (SSH) model of non-interacting fermions, which can be realized by hard-core bosons. When the hard-core constraint is removed, we obtain a bosonic system with inversion-symmetry protected topological order. Because the chiral symmetry is broken by finite interactions, the bulk-boundary correspondence of the SSH model is no longer valid. Nevertheless we show that the fractional part of the charge which is localized at the edge can distinguish topologically trivial- from non-trivial states. We generalize our analysis by including nearest neighbor interactions and present a topological classification of the resulting quarter-filling Mott insulating phase. In this case fractionally charged bulk excitations exist, which we identify in the grand-canonical phase diagram.

¹F.G. acknowledges support from the Graduate School of Material Science MAINZ.

Fabian Grusdt University of Kaiserslautern

Date submitted: 30 Jan 2015

Electronic form version 1.4