Statistically induced quantum phase transitions in the extended Anyon-Hubbard model

Kevin Jägering and Martin Bonkhoff
Departement of Physics, Technische Universität Kaiserslautern, 67663 Kaiserslautern, Germany
jaegering@physik.uni-kl.de and martinbonkhoff@gmx.de

Recently it has been shown that one-dimensional abelian anyons can be realized via density-dependent Peierls phases in bosonic models [1]. Furthermore extended interactions as well as a particle number constraint in bosonic Hubbard models can lead to a Symmetry-Protected Topological (SPT) Haldane insulator phase [2]. As both features stem from a non-trivial topology in configuration space and symmetry group, respectively, we are interested in the competition of intrinsic anyonic order and SPT-order. In the first talk we give a brief introduction and present our numerical DMRG-results, while the second talk provides analytical explanations as well as a classification of the occurring phase transitions via an effective low-energy field theory.

[1] T. Keilmann, S. Lanzmich, I. McCulloch, and M. Roncaglia, *Statistically induced phase transitions and anyons in 1d optical lattices*, Nat. Commun. **2**, 361 (2011).

[2] E. Berg, E.G.D. Torre, T. Giamarchi, and E. Altman, *Rise and fall of hidden string order of lattice bosons*, Phys. Rev. B **77**, 245119 (2008).

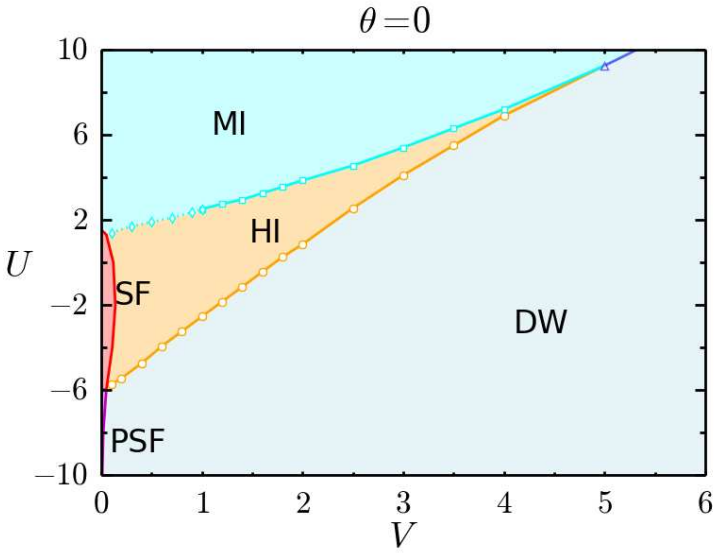

Figure 1: Quantum phase diagram of the extended Bose-Hubbard model.