P. Ohberg: *Simulating an interacting gauge theory with ultracold Bose gases*

We show how density dependent gauge potentials can be induced in dilute gases of ultracold atoms using light-matter interactions. We study the effect of the resulting interacting gauge theory and show how it gives rise to novel topological states in the ultracold gas. We find in particular that the onset of persistent currents in a ring geometry is governed by a critical number of particles. The density-dependent gauge potential is also found to support chiral solitons in a quasi-one-dimensional ultracold Bose gas.