DAMOP20-2020-001244

Abstract for an Invited Paper
for the DAMOP20 Meeting of
the American Physical Society

Equilibrium and Dynamics of Bose Condensates with Density-Dependent Gauge Field

CHENG CHIN, James Franck institute, Enrico Fermi institute, University of Chicago

We demonstrate density-dependent gauge fields based on periodically driven atomic quantum gases. The gauge field results from the synchronous modulation of atomic interactions near a Feshbach resonance and micromotion in a phase-modulated two-dimensional optical lattice. The coherence between the modulations breaks the time reversal symmetry and couples the quasi-momenta to the on-site interactions, and the resulting effects can be captured by a density-dependent gauge field. Novel D2 and D4 quantum phase transitions and topological defects are observed and will be presented in the talk. We envision that the density-dependent gauge fields will provide a stepping stone to simulate novel quantum phenomena in the presence of dynamical gauge fields.