Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Non-equilibrium phase transitions in a driven-dissipative system of interacting bosons JEREMY T. YOUNG, Joint Quantum Institute, MICHAEL FOSS-FEIG, Army Research Lab, ALEXEY V. GORSHKOV, Joint Quantum Institute, MOHAMMAD F. MAGHREBI, Michigan State University — Atomic, molecular, and optical systems provide unique opportunities to study simple models of driven-dissipative many-body quantum systems. Typically, one is interested in the resultant steady state, but the non-equilibrium nature of the physics involved presents several problems in understanding its behavior theoretically. Recently, it has been shown that in many of these models, it is possible to map the steady-state phase transitions onto classical equilibrium phase transitions. In the language of Keldysh field theory, this relation typically only becomes apparent after integrating out massive fields near the critical point, leaving behind a single massless field undergoing near-equilibrium dynamics. In this talk, we study a driven-dissipative XXZ bosonic model and discover critical points at which two fields become gapless. Each critical point separates three different possible phases: a uniform phase, an anti-ferromagnetic phase, and a limit cycle phase. Furthermore, a description in terms of an equilibrium phase transition does not seem possible, so the associated phase transitions appear to be inherently non-equilibrium.

Jeremy T. Young
Joint Quantum Institute

Date submitted: 29 Jan 2017 Electronic form version 1.4