Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

**Non-equilibrium fixed point of a driven-dissipative model: A tale of two Ising systems** MOHAMMAD MAGHREBI, Michigan State University, JEREMY YOUNG, ALEXEY GORSHKOV, University of Maryland at College Park, MICHAEL FOSS-FEIG, Honeywell Research Laboratory — Driven-dissipative systems, characterized by a fast external drive as well as a coupling to a dissipative bath, are not only relevant to a vast range of experimental platforms, but also pose fundamental questions about the nature of non-equilibrium states and dynamics. In this talk, I will discuss a driven-dissipative system of bosons that can be mapped to a system of two coupled Ising-like order parameters at different effective temperatures. I will argue that this model possesses a new non-equilibrium fixed point with features that have no counterpart in equilibrium. Specifically, a generic continuous scale invariance at criticality is reduced to a discrete scale invariance. This will further result in complex-valued critical exponents, a spiraling phase boundary, and a complex Liouvillian gap even close to the phase transition. As direct evidence of the non-equilibrium nature of the fixed point, we find that the fluctuation-dissipation relation is violated at all scales, leading to an effective temperature that becomes "hotter" and "hotter" at longer and longer wavelengths. I will also discuss how a system of cavity arrays with cross-Kerr nonlinearities enables the observation of this non-equilibrium behavior.

Mohammad F. Maghrebi
Michigan State University

Date submitted: 01 Feb 2019 Electronic form version 1.4