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Limit cycle phase in driven-dissipative spin systems CHING-KIT CHAN, TONY LEE, ITAMP, Harvard University, SARANG GOPALAKRISHNAN, Harvard University — Quantum simulator experiments based on trapped ions and atomic ensembles offer an attractive platform to study nonequilibrium many-body phases and phase transitions. We theoretically explore the phase diagram of a driven and dissipative Heisenberg spin system featured by a time-dependent limit cycle phase in which the magnetization oscillates in time. We present a Gaussian-Floquet theory to study the fluctuation of this phase that spontaneously breaks time-translational symmetry. As a time-dependent generalization of the Mermin-Wagner theory, we show how spatial fluctuations destroy the limit cycle ordering for dimension ≤ 2. We also demonstrate how the limit-cycle phase leads to new features in the power spectrum measurable in fluorescence experiments.

Ching-Kit Chan
ITAMP, Harvard University

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