HQOC

INSTITUTE FOR THEORETICAL ATOMIC, MOLECULAR AND OPTICAL PHYSICS
at the Harvard-Smithsonian Center for Astrophysics and Harvard Physics Department, Cambridge MA USA

HARVARD Quantum Optics Center

Special Seminar

Wednesday | Jan. 16 | 4:00 pm
Lyman 425

Eric Kessler

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Garching, Germany**

"Dissipative Phase Transitions in Central Spin Systems"

Recent experimental and theoretical developments showed that highly coherent many body physics can emerge even under open system conditions. One prominent example is constituted by the phenomena of dissipative (or dynamical) phase transitions (DPT). In these non-equilibrium situations, distinct quantum phases and transitions with intriguing properties have been reported. However, the theory of DPT is far less developed than in the equilibrium counterpart, i.e. for quantum phase transitions. Against this background, we present an instructive example for DPT in a generic, driven and damped central spin setting. We derive analytically a complete picture of the system's rich steady state phase diagram, which comprises effects like first and second-order phase transitions, as well as regions of bistability, spin squeezing and altered spin pumping dynamics. Further, we discuss the intimate relation between the low excitation spectrum of the Liouville operator and the classification of different transitions, and we consider adaptations of the model for realistic experimental realizations in Nitrogen-Vacancy centers and quantum dots.

Refreshments will be served