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Dynamical Mean-Field Theory for Open Many-Body Quantum Systems

Understanding and simulating the complexities of quantum many-body systems out of equilibrium is still a major challenge in quantum physics. In this talk, I will introduce Dynamical Mean-Field Theory (DMFT) as a powerful approach to tackle this problem, with a focus on bosonic, driven-dissipative lattices.

Starting from the basic intuition behind DMFT, I will discuss its extension to open, bosonic quantum systems (OpenBDMFT) and highlight recent insights —such as the emergence of the steady-state quantum Zeno effect —that showcase the method's reach and versatility. I will also discuss numerical strategies —including Krylov subspaces and polynomial expansions —that allow OpenBDMFT to scale beyond the limits of full exact diagonalization.

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