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Quantum non-equilibrium processes with absorbing states

Understanding quantum many-body systems out of equilibrium is a central challenge of contemporary physics and poses significant obstacles for theory and experiment.

In this talk I will discuss recent theoretical work on quantum many-body systems featuring absorbing state phase transitions, which represent a particular class of non-equilibrium processes. I will show how their physics can be probed on quantum simulator platforms based on Rydberg atoms held in optical lattices. These setups allow in principle to systematically interpolate between a classical limit which can be efficiently solved and a quantum limit which is challenging to analyze theoretically. They therefore provide an ideal test bed for identifying new physical phenomena and for scrutinizing theoretical approaches such as numerical algorithms and analytic approximation schemes.