

Quantum many-body scars in 2+1D gauge theories

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Gauge theories are fundamental to the Standard Model of particle physics, and their non-perturbative aspects have traditionally been studied through classical simulations of a theory formulated on a space-time lattice. However, these simulations are often computationally expensive, and many observables remain entirely inaccessible. Quantum simulators present an exciting alternative, where formulating gauge theories as quantum many-body Hamiltonians opens the door to studying their dynamics over time. Examples of such real-time quantities are quantum many-body scars, where a system starting from small subset of initial states fails to thermalize even after long evolution times. The quantum many-body scars have been observed in simple gauge theories and reveal rich underlying physics. In this talk, I will introduce gauge theories in the Hamiltonian formalism and discuss recent results on quantum many-body scars in 2+1 dimensional lattice gauge theories. These insights can help guide near-term experimental efforts to characterize novel phenomena in gauge theories.

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