



Contribution ID: 95    Type: 5th week (Formal developments and other frontiers in lattice QCD)

## Quantum Many-Body Scars in 2+1D Gauge Theories

*Friday, November 15, 2024 3:30 PM (1 hour)*

Real-time dynamics of Quantum Chromodynamics and other strongly coupled gauge theories present significant challenges for standard Monte Carlo methods due to severe sign problems. This limitation makes these problems ideal candidates for quantum simulation techniques. Identifying phenomena that can be tackled using near-term quantum simulators is crucial for understanding real-time dynamics in strongly coupled gauge theories.

Systems exhibiting quantum many-body scars challenge established notions of thermalization. They fail to thermalize after a long time when starting from a small subset of initial states. I will discuss the emergence of quantum many-body scarring in  $U(1)$  gauge theories in  $(2+1)$ -d and arbitrary dimension of the gauge links. We uncover an analytical structure that allows for the construction of scar states. These results shed light on how many-body systems may fail to thermalize and can guide near-term experimental characterization of novel phenomena in gauge theories.

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