

Hamiltonian Truncation Framework for Gauge Theories on the Interval

Wednesday 26 November 2025 12:10 (25 minutes)

Gauge theories in two dimensions provide a powerful testing ground for understanding strongly coupled quantum field theories. In this talk, I'll present an alternative numerical approach based on Hamiltonian truncation for investigating these theories nonperturbatively. We work on a spatial interval and fix to axial gauge, eliminating gauge field degrees of freedom entirely, thus allowing us to express the interacting theory directly in the basis of free Dirac eigenstates, truncated at finite energy. As a first step, I'll show how this framework accurately reproduces the spectrum of the Schwinger model, matching the exact results from bosonisation across a wide range of couplings. I'll then explain how the same construction can be extended to nonabelian gauge groups, and I'll present results for $SU(3)$ gauge theory with a single massless Dirac fermion. This provides a complementary and versatile alternative to lattice field theory, opening new avenues for real-time dynamics and quantum simulation of gauge theories.

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