Contribution ID: **2** Type: **not specified**

Guass's Law and Hilbert Space Constructions for U(1) Lattice Gauge Theories

Wednesday, September 12, 2018 9:40 AM (25 minutes)

Motivated by the limited capabilities of near-term quantum computers, we reconsider the Hamiltonian formulation of lattice gauge theories and the method of truncating Hilbert space to render it finite-dimensional. Conventional formulations lead to a Hilbert space largely spanned by unphysical states; given the current inability to perform fault-tolerant large scale quantum computations, we examine here how one might restrict wave function evolution entirely or mostly to the physical subspace. We consider such constructions for the simplest of these theories containing dynamical gauge bosons — $U(1)$ lattice gauge theory without matter in d = 2, 3 spatial dimensions — and find that electric-magnetic duality naturally plays an important role. We conclude that this approach is likely to significantly reduce computational overhead in d = 2 by a reduction of variables. We further investigate potential advantages of regulating magnetic fluctuations in asymptotically-free theories, instead of electric fluctuations, which have been the focus of previous truncation proposals.

Presenter: Dr STRYKER, Jesse (University of Washington)

Session Classification: Session 1