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## Toward Simulations of Scalar Quantum Electrodynamics on Quantum Computers

*Monday 26 July 2021 21:00 (15 minutes)*

The gauge-invariant formulations of lattice field theories provide a way to study real-time dynamics using a smaller effective Hilbert space. This allows for more information to be encoded for the same quantum resources as a non-gauge invariant formulation which will be important for simulations on Noisy Intermediate Scale Quantum (NISQ) computers. While qubit-based hardware is currently the most widely available, it does not naturally reflect the Hilbert spaces of complicated quantum field theories. Qudits (n-state objects) provide a more natural description of the Hilbert spaces. The purely bosonic nature of Compact Scalar Quantum Electrodynamics (csQED) provides a nice test-bed for qudit based digitizations and truncations of continuous symmetries. We will discuss the methods of digitizing csQED for qudit-based quantum computers, the robustness to different types of noise balanced with accuracy of field truncations.

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