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Quantum computational resources for lattice QCD in the strong-coupling limit

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We consider the strong coupling limit of Lattice QCD with massless staggered quarks and study the resource requirements for quantum simulating the theory in its Hamiltonian formulation. The bosonic Hilbert space of the color-singlet degrees of freedom grows quickly with the number of quark flavors, making it a suitable testing ground for resource considerations across different platforms. In particular, in addition to the standard model of computation with qubits, we consider mapping the theory to qudits ($d > 2$) and qumodes, as used on trapped-ion systems and photonic devices, respectively.

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