

# Towards quantum simulation of gauge/gravity duality and lattice gauge theory

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## Quantum algorithms from algebraic Hilbert spaces.

*Monday 4 March 2024 10:00 (1 hour)*

The structure of composite operators in gauge quantum field theories with matrix or tensor degrees of freedom is controlled by hidden symmetries which organise the combinatorics of gauge invariants. These include group algebras of symmetric groups and associated natural generalisations. Dualities in string theory, in particular gauge-string duality, motivate the formulation of new classical and quantum algorithms based on structural properties of these algebras. I will describe an interesting number sequence  $k_*(n)$  associated with symmetric groups on  $n$  elements, which plays an important role in these structural properties and determines the complexities of the associated quantum algorithms. The talk will be based on <https://arxiv.org/abs/1911.11649> and <https://arxiv.org/abs/2303.12154>.

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