

Fermionic Bricks in the Wall

Monday 30 September 2024 14:00 (1 hour)

We study brick wall quantum circuits enjoying a global fermionic symmetry. The constituent 2-qubit gate, and its fermionic symmetry, derive from a 2- particle scattering matrix in integrable, supersymmetric quantum field theory in 1+1 dimensions. Our 2-qubit gate, as a function of three free parameters, is of so-called free fermionic or matchgate form, allowing us to derive the spectral structure of both the brick wall unitary U_F and its, non-trivial, hamiltonian limit H_γ in closed form. We find that the fermionic symmetry pins H_γ to a surface of critical points, whereas breaking that symmetry leads to non-trivial topological phases. We explore quench dynamics for this class of circuits.

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