

F-bases, Bethe Ansatz, and Quantum Circuits.

We obtained a quantum circuit to prepare Bethe states. The quantum circuit is deterministic and has multi-qubit unitaries. The quantum circuit is limited to quantum-integrable spin-1/2 chains with periodic boundary conditions that are homogeneous nonetheless, such as the Heisenberg XXZ model. In this talk, we report our progress in the systematisation of quantum circuits for Bethe states. We show that the F-basis permits a rephrasing of Bethe states in terms of a preferred matrix-product state, which turns into a quantum circuit under unitarisation. We connect the matrix-product state with the coordinate Bethe Ansatz. We illustrate our approach in the construction of the quantum circuit for the inhomogeneous Heisenberg XXZ model. This work has been developed in collaboration with Esperanza López, Balázs Pozsgay, Germán Sierra, and Alejandro Sopena.

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