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Fuzzy sphere regularization of the 1+1 dimensional sigma model

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In order to simulate quantum field theories using quantum computers, a regularization of the target space of the field theory must be obtained which admits a representation in terms of qubits. For the 1+1 dimensional nonlinear sigma model, there have been several proposals for how such a regularization may be achieved. The fuzzy sphere regularization proposes to represent the Hilbert space of the NLSM by a truncation of the noncommutative 2-sphere, a truncation which nonetheless preserves the continuous O(3) symmetry of the theory. In this talk, we discuss an attempt to demonstrate that this regularization reproduces the same physics as the O(3) sigma model using the machinery of matrix product states.

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