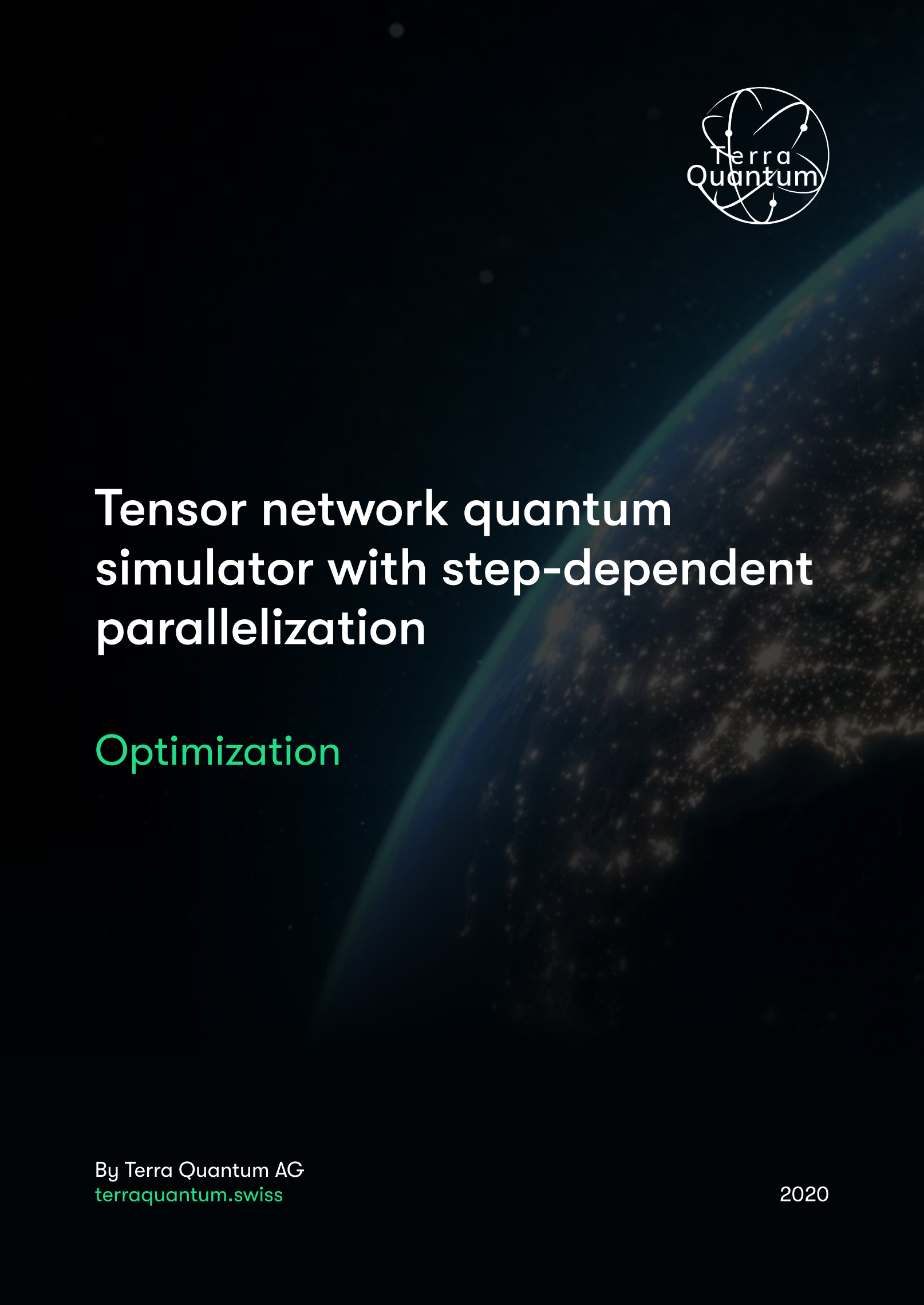


# Tensor network quantum simulator with step-dependent parallelization

## Optimization

By Terra Quantum AG
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# Tensor network quantum simulator with step-dependent parallelization

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## ABSTRACT

In this work, we present a new large-scale quantum circuit simulator. It is based on the tensor network contraction technique to represent quantum circuits. We propose a novel parallelization algorithm based on step-dependent slicing . In this paper, we push the requirement on the size of a quantum computer that will be needed to demonstrate the advantage of quantum computation with Quantum Approximate Optimization Algorithm (QAOA). We computed a single amplitude of QAOA ansatz state on 210 qubits. The simulation involved 1,785 gates on 1,024 nodes of the Cray XC 40 supercomputer Theta. To the best of our knowledge, this constitutes the largest simulation of QAOA ansatz simulations reported to this date.

*The full article can be found here:*
*https://ieeexplore.ieee.org/abstract/document/9951269*