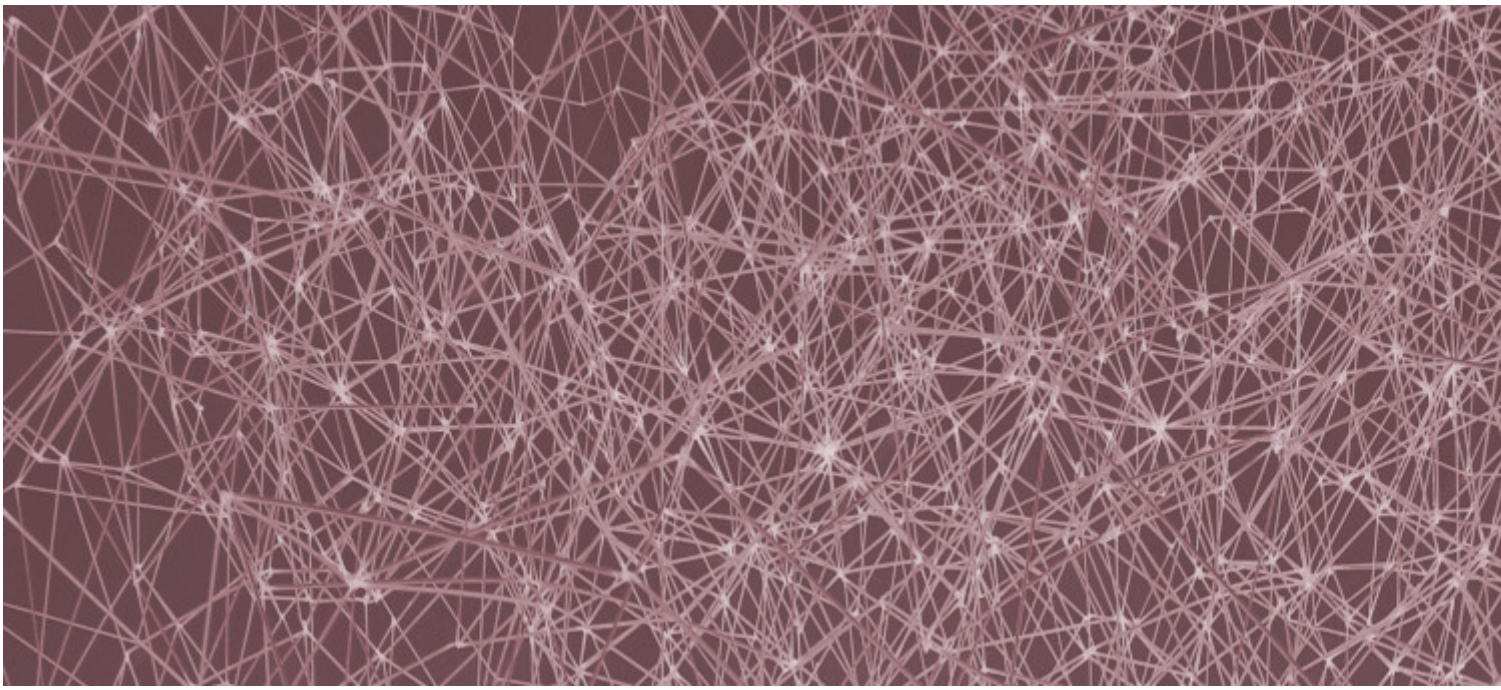
Tensor Networks



Tensor Networks offer an efficient description of Quantum systems, and have applications in many areas of science and engineering. We develop HPC implementations of Tensor Networks, and we use them to simulate Quantum systems and Quantum computations.

Summary

Tensor Networks have been identified as a powerful tool to represent and study Quantum systems, but also with applications beyond Quantum theory. Algorithms using Tensor Networks are used to study fundamental aspects of Quantum systems. Moreover, these computations can be run efficiently on normal computers.

Our projects builds efficient tools to manipulate Tensor Networks in a distributed architecture, using HPC systems to reach a large system size. Memory management and optimal contraction strategies are fundamental for an efficeint Tensor Network library, and our work adapts to heterogeneous computing architectures.

Objectives

- To develop a HPC library of Tensor Networks

- To simulate large Quantum circuits
- To develop novel algorithms for Tensor Network manipulation and contraction

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