Bachelor Thesis - Project Description

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Supervisors

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Title

Implementation of the Densitiy Matrix Renormalization Group Algorithm for Empa applications

Description

The Densitiy Matrix Renormalization Group (DMRG) Algorithm was created to find approximately the dominant eigenvector of a large matrix. It can be used to find the ground state of the Hamiltonian in many-body quantum systems in polynomial time. This is higly useful for understanding the properties of materials at quantum level. Additionally, the DMRG algorithm can be used to simulate systems with high corrolations due to its low comuputational cost and still high accuracy.

Goal

In this bachelor thesis, the goal is to efficiently implement the DMRG algorithm for application at Empa. This means that the algorithm will be included into simulations used in the laboratories in in addition to the current used software. The algoritm will be implemented in Julia / C++ / TBD?.