Computations in Quantum Tensor Networks

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We consider tensor representations of vectors. The vector x we are looking for is the eigenvector to the smallest eigenvalue of a Hamiltonian matrix which describes a spin system with N particles for large N. Hence, the length of the vector is 2^N, and the vector cannot be stored explicitly. Therefore, the vector is approximated via the Matrix Product State (MPS) ansatz (similar to a Tensor Train representation). We discuss properties of MPS vectors and operators, e.g. normalization, symmetries, Matrix Product Operators, and related eigenvalue problems and computations.