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[137] Hardware-Tailored Diagonalization Circuits

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A subroutine of many quantum algorithms is the diagonalization of Pauli operators. Although it is always possible to construct a quantum circuit that simultaneously diagonalizes commuting Pauli operators, only resource-efficient circuits are reliably executable on near-term quantum computers. Generic circuits lead to a Swap-gate overhead on quantum devices with limited connectivity. A common alternative is excluding two-qubit gates which comes at the cost of restricting the class of diagonalizable sets to tensor product bases (TPBs). Here, we introduce a framework for constructing hardware-tailored (HT) diagonalization circuits. We group the Pauli operators occurring in the decomposition of popular Hamiltonians into jointly-HT-diagonalizable sets and observe that our approach can outperform conventional approaches.

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