Features

Features	HQS	Qiskit	What is it good for?
Flexible Generation of Trotterized Time Evolution	● (full)	◐ (half)	Perform efficient time evolution of spin systems on a quantum computer, for instance for NMR simulation. Trotterized time evolution is the basis of applications with expected near-term quantum advantage.
Non-Unitary Gates	● (full)	◔ (quarter)	Enable novel quantum computing paradigms inspired by cooling and open quantum systems, for example approaches like thermal gradient descent for finding minima.
Seamless Generation of Circuits for Open Quantum Systems	● (full)	○ (empty)	Starting from a system-bath Hamiltonian, choose either a linear or all-to-all algorithm and generate a quantum circuit with a built-in system-bath mapping.
NMR and Spin Correlation Functions	◔ (quarter)	○ (empty)	Pass a spin hamiltonian (e.g. NMR hamiltonian) to the HQS Qorrelator App and get a QuantumProgram compiled for your device.
Seamless Database Integration	● (full)	◐ (half)	For the definition of both a use case and its corresponding quantum program, HQS uses the JSON format which can be easily stored and shared. This allows not only for an easy integration of all the HQS tools into e.g. a database, but also for smooth collaboration, without the exchange of large python programs.
Interoperability (Transpilers, QPUs, Quantum Toolkits)	◔ (quarter)	◐ (half)	HQS uses well-defined exchange formats for the problem description and quantum program: struqture and qoqo (respectively), both of which are open-source packages. These formats are connected to various existing backends and can also easily be connected to other formats by the user. For instance, there is a qoqo to QASM backend and a struqture to QuTIP backend. Therefore, this allows for easy connection to transpilers, QPUs and quantum toolkits.
Prebuilt Variational Algorithms (QAOA, VQE)	○ (empty)	● (full)	Variational algorithms are a great way to get started into quantum computing. However, HQS does not believe that variational algorithms can achieve quantum advantage.
Error Mitigation	○ (empty)	● (full)	Error mitigation features are best provided by the quantum computing hardware manufacturers.

Add-On

	HQS	Qiskit	What is it good for?
Advanced classical solvers (for benchmarking)	● (full)	○ (empty)	To achieve quantum advantage, comparing to the best possible classical software is crucial. See our use case discussion.

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