PROJECT NUMBER

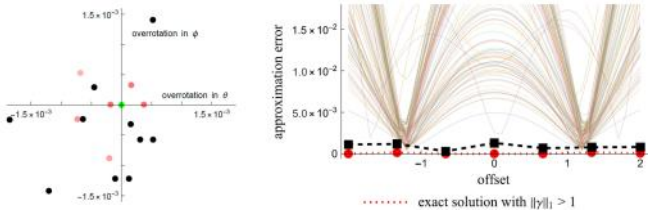
22576

Probabilistic sparse synthesis of quantum operations

Probabilistic method enables exact quantum operations beyond current hardware limits.

Many operations, such as quantum computing gates or control pulses for NMR/MRI, cannot be feasibly implemented using current hardware or require coherence times that are unachievable. Oxford researcher's new probabilistic approach enables the exact implementation of such operations.

Applications: Quantum computing, magnetic resonance imaging, nuclear magnetic resonance



Features	Benefits
The method synthesises a desired quantum operation from a library of approximations that can be realised natively in quantum hardware	The approach allows quantum operations to be synthesised that would be impossible to implement directly in current quantum hardware
Uses classical computers to numerically pre-process the probabilistic scheme	Achieves orders of magnitude lower measurement overheads than other probabilistic schemes
Uses more generalised mathematical approach compared to other probabilistic techniques	Can be applied to a broad range of scenarios including quantum gate synthesis, quantum optimum control, and NMR and MRI operations

Features	Benefits
Doesn’t require both Clifford and T gate sequences unlike current probabilistic methods to synthesis quantum gates	It is directly compatible with error mitigation and advanced, randomised measurement techniques
	Can exactly synthesis a quantum operation requiring only a small increase in the number of times the operation needs to be repeated

Patented and Available for

- Co-development
- Consulting
- Licensing

To find out more, contact enquiries@innovation.ox.ac.uk and quote the project number.