Coherent Analogue Quantum Computing - beyond the paradigm of gate based quantum computing.

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Abstract

As the full control of few-qubit systems has come to fruition in the past decade, the search has begun to engineer useful quantum processors in the NISQ era providing simulations for the industry. The most common gate-based style approach suffers from gate-errors, and can only give useful solutions if the system is fully error-corrected. We propose a different path, that of coherent analogue computing: this relies on a network of coherent flux-qubits, designed to simulate a specific quantum system. These processors can embed Hamiltonians beyond the Ising model, called non-stoquastic Hamiltonians, which are too costly for classical computers to simulate. Our approach of coherent analogue computing offers unique capabilities currently not available in the market.