Neutral atom quantum computing at QuEra Computing

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Quantum error correction is believed to be necessary for universal quantum computation due to its ability to correct inevitable errors arising in quantum computers. Recently, neutral atom quantum computers have demonstrated key aspects of scalable quantum error correction, such as the implementation of circuits with 48 logical qubits [1], magic state distillation [2] and architecture for universal fault-tolerant quantum processing [3].

In this talk, I will introduce QuEra Computing's approach to neutral atom quantum computing. I will discuss neutral atom qubits, the tools that are used to control them and the implementation of gate operations and qubit reconfigurability. With these basic building blocks, I will present a neutral atom quantum computing platform based on highly parallel operations and qubit shuttling. Next, I will present QuEra Computing's quantum computers, from the publicly accessible analog computer Aquila to our next-generation digital systems, along with the open-source software stack that exposes them to users. Finally, I will give an overview of recent demonstrations of scalable logical qubit processing in neutral atom platforms employing qubit shuttling, including implementation of logical magic state distillation [2].

REFERENCES

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