

## Quantum Physics

# Resources for Measurement-Based Quantum Carry-Lookahead Adder

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We present the design of a quantum carry-lookahead adder using measurement-based quantum computation. QCLA utilizes MBQC's ability to transfer quantum states in unit time to accelerate addition. The quantum carry-lookahead adder (QCLA) is faster than a quantum ripple-carry adder; QCLA has logarithmic depth while ripple adders have linear depth. QCLA is an order of magnitude faster than a ripple-carry adder when adding registers longer than 100 qubits but requires a cluster state that is an order of magnitude larger. Hand optimization results in a  $\approx 26\%$  reduction in spatial resources for the circuit.

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