

Teleportable Quantum Computing with Predictive Qubit Cloning

Performance and Energy Efficiency Gains from Predictive Qubit Cloning

Integrating predictive qubit cloning within the ACTA (Active Quantum Teleportation Architecture) model produces not only faster computation but also significantly improved energy efficiency. While traditional quantum systems require all operations to follow a fixed path and collapse, predictive cloning allows ACTA to compute using the transient shadows of qubits during teleportation cycles.

Based on theoretical modeling:

- ACTA alone improves execution speed by approximately 2x.
- ACTA with predictive qubit cloning can reach 2.5x to 5x execution speed.

This performance gain translates directly into energy savings:

- Quantum Classical (No ACTA): 1000 μ J
- ACTA (No Cloning): 500 μ J
- ACTA + Predictive Cloning (2.5x): 400 μ J
- ACTA + Predictive Cloning (5x): 200 μ J

Therefore, systems implementing ACTA with predictive qubit cloning may effectively achieve 5x computational efficiency under the same energy constraints, opening a new frontier in ultra-fast quantum AI, simulation, and secure processing environments.

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