



# **ADIABATIC STATE PREPARATION WITH CUSTOM QUANTUM GATES**

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Quantum algorithms are most commonly implemented in terms of a universal set of quantum gates. The decomposition of the unitaries defining these algorithms into those in the universal set often yields quantum circuits with depths that prohibit their execution on noisy intermediate-scale quantum hardware. We simulate the execution of an adiabatic-state-preparation algorithm with reduced depth achieved through the usage of custom gates realizing the small-time propagators at each Trotter step. In these simulations the target state was reached with fidelities above 95%, showing a considerable improvement over simulations implementing the same algorithm in terms of the quantum gates in the universal set used by IBM Quantum machines, as well as results from actual runs on IBM Quantum hardware.

**Tuesday, September 27<sup>th</sup>, 2022**

**4:00 pm**

**Lindley Hall room 321**