

Abstract Submitted  
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**Artificial Quantum Thermal Bath** ALIREZA SHABANI, HARTMUT NEVEN, Google Quantum AI Lab — In this talk, we present a theory for engineering the temperature of a quantum system different from its ambient temperature, that is basically an analog version of the quantum metropolis algorithm. We define criteria for an engineered quantum bath that, when couples to a quantum system with Hamiltonian  $H$ , drives the system to the equilibrium state  $\frac{e^{-H/T}}{\text{Tr}(e^{-H/T})}$  with a tunable parameter  $T$ . For a system of superconducting qubits, we propose a circuit-QED approximate realization of such an engineered thermal bath consisting of driven lossy resonators. We consider an artificial thermal bath as a simulator for many-body physics or a controllable temperature knob for a hybrid quantum-thermal annealer.

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