Adiabatic Quantum Simulators

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Quantum Simulation

$$H|\Psi\rangle = E|\Psi\rangle$$

Classical algorithms
(HF, CC, QMC, DFT, FCI, ...)

Quantum algorithms
(Creating Hamiltonian mappings)

Quantum Circuits

The equation for the absorption spectrum has the same form as PEA.

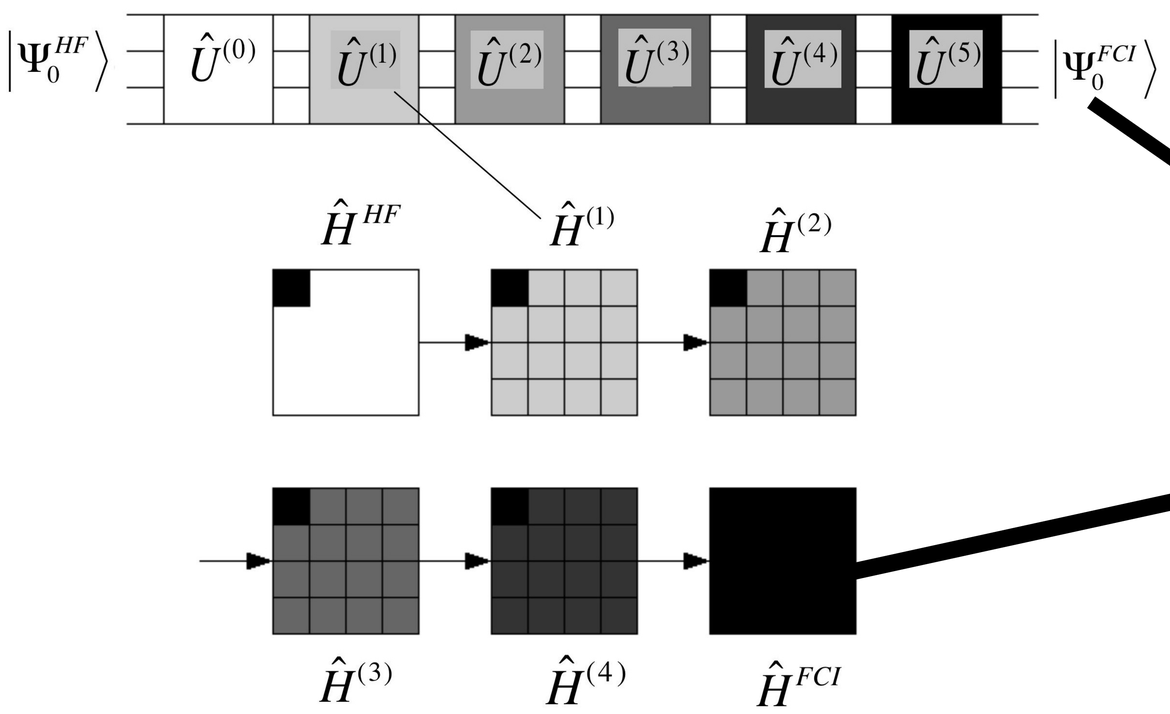
$\mathcal{F}$ **[P(t)]=P(ω)** $P(t)=\langle\Psi_0|\Psi_t\rangle$

Minimal basis H_2 Energy
8 bits, noiseless
7.98×10^5 gates

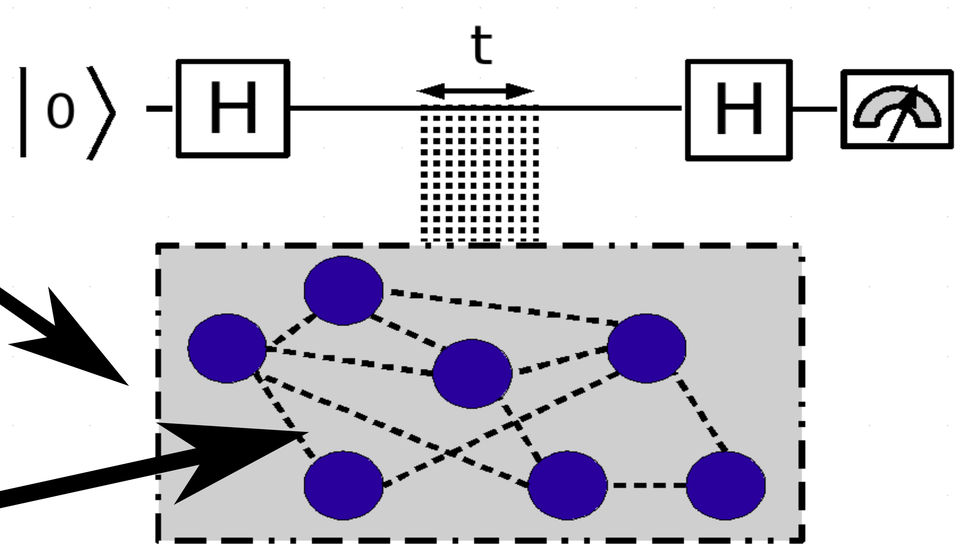
Phase estimation requires ongoing evolution at the expense of many gates

Adiabatic Quantum Simulation

Adiabatic model



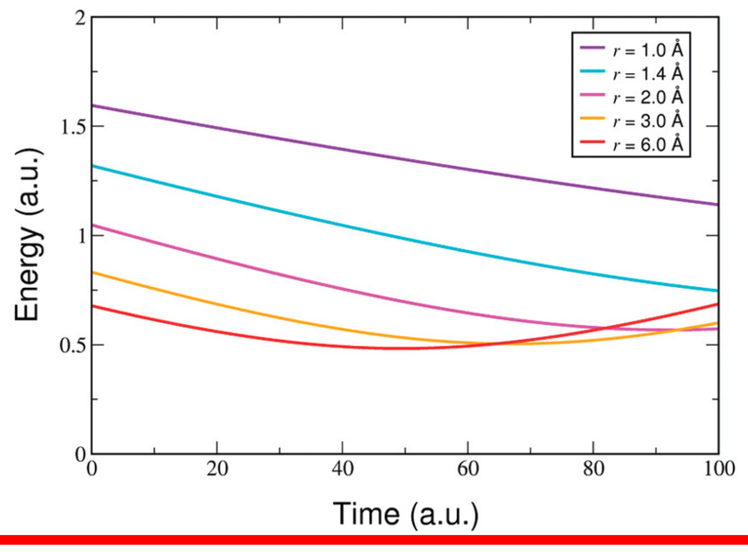
Simulator



Depending on the interaction time, t, and the energy splitting of the probe, δ, qubit and ground state energy, E_0, the measurement probability varies as $P(0)=\cos^2[(E_0+\delta)t/2\hbar]$

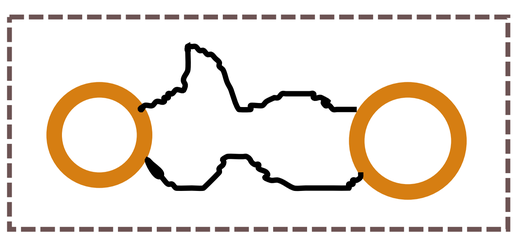
Numerics

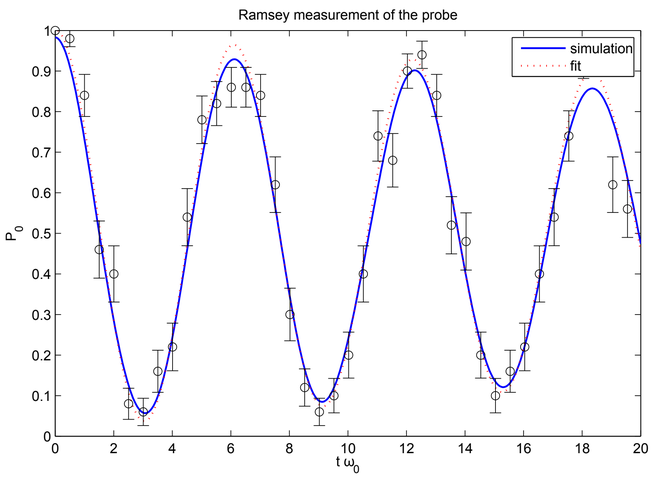
Excitation gap for H_2



Markovian noise simulation

Probe qubit





System: 2 qubits, random Hamiltonian