

5.1 Problem set 5

Problem 5.1: CNOT gate

Consider two Rydberg atoms, atom 1 and atom 2, where the lowest energy level is considered $|1\rangle$ and first level above it is $|0\rangle$. The Rydberg level is denoted $|r\rangle$.

Give the sequence of driving pulses for these two atoms that implements the CNOT gate, where atom 1 is considered the control qubit while atom 2 is the target qubit.

Problem 5.2: Toffoli gate

We add a third Rydberg atom to the system proposed in **Problem 5.1**—atom 3. Determine the driving pulses that implement the Toffoli gate, if we suppose that atom 1 and atom 3 are the control qubits while atom 2 is the target qubit.