QUANTUM PERIODIC CAVITY SYSTEMS

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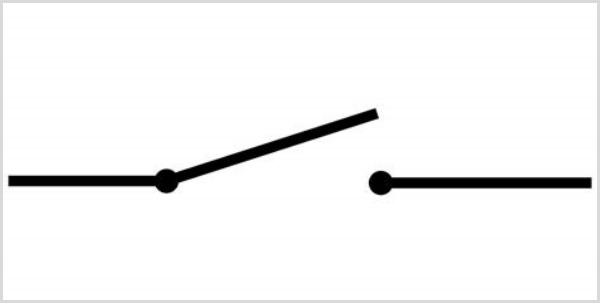
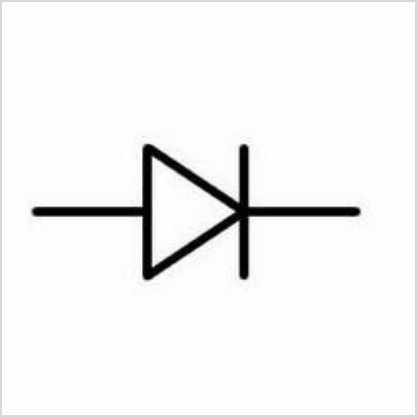
Goal: design a system with a specific response

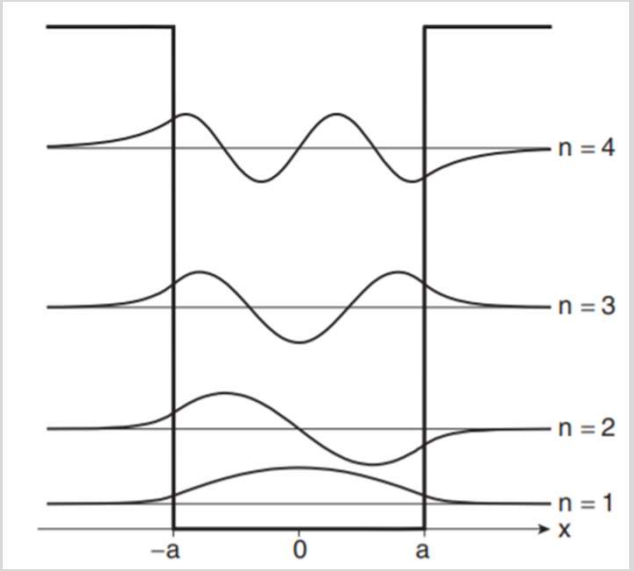
- Control when the current is present or not (behaves like a switch)
- Directionality (behaves like a diode)
- Wide ranging applications



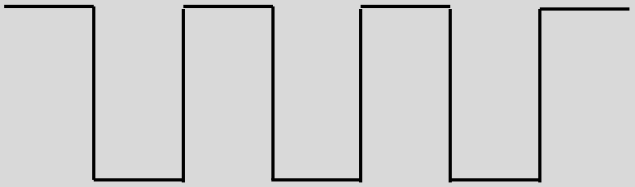


Quantum level

- As computing technology gets increasingly smaller, quantum effects become more important
- Represent the probability of finding a particle in a location
- Must use the Schrodinger equation to determine how the system evolves with time

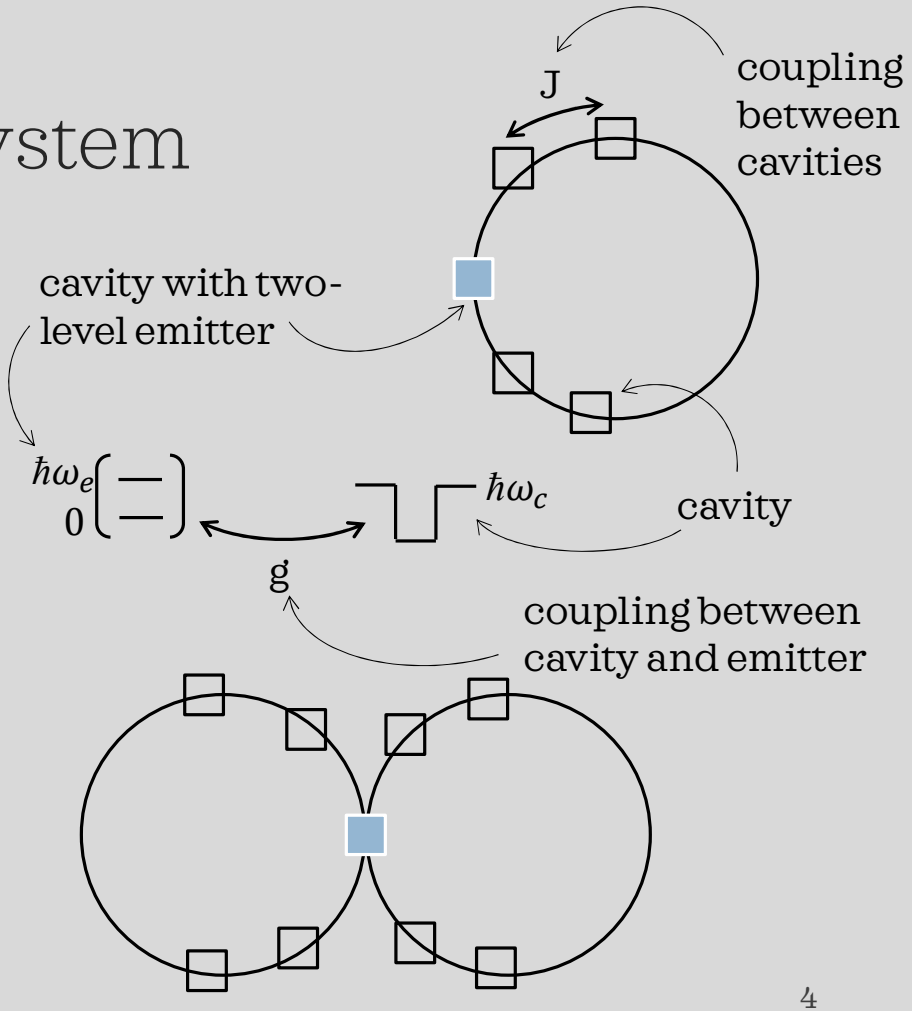


David McIntyre, *Quantum Mechanics*, Figure 5.17



Model: periodic cavity system

- System of connected finite square well potentials (cavities)
- Periodic to eliminate boundary conditions
- Beginning with one ring of cavities and one two-level emitter, becoming more complex
- Assuming that every cavity is linked to only its immediate neighbors



Method

- Construct the Hamiltonian for the system
- Apply Schrodinger time dependence to see how the population density changes with time
- Looking for interesting patterns in the time evolution of the states