

Quantum Information with Solid-State Devices

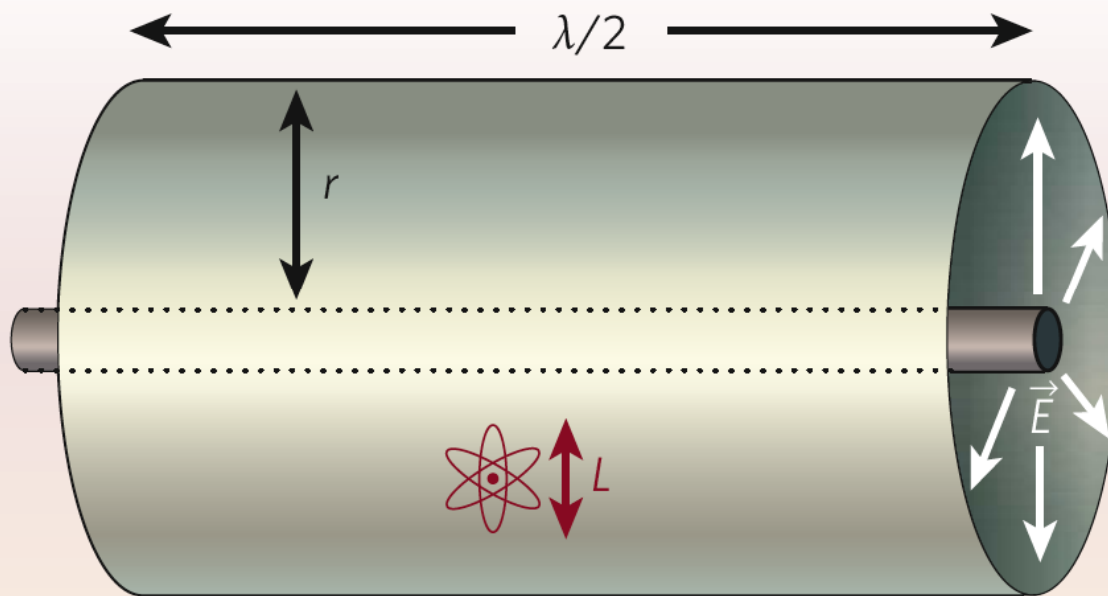
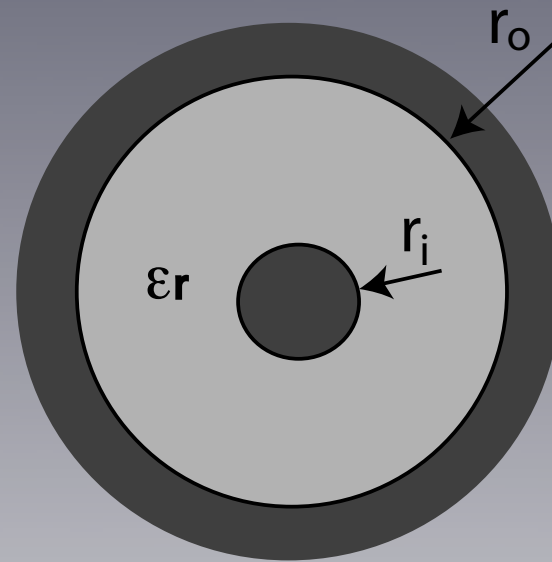
VO 141.246

Dr. Johannes Majer

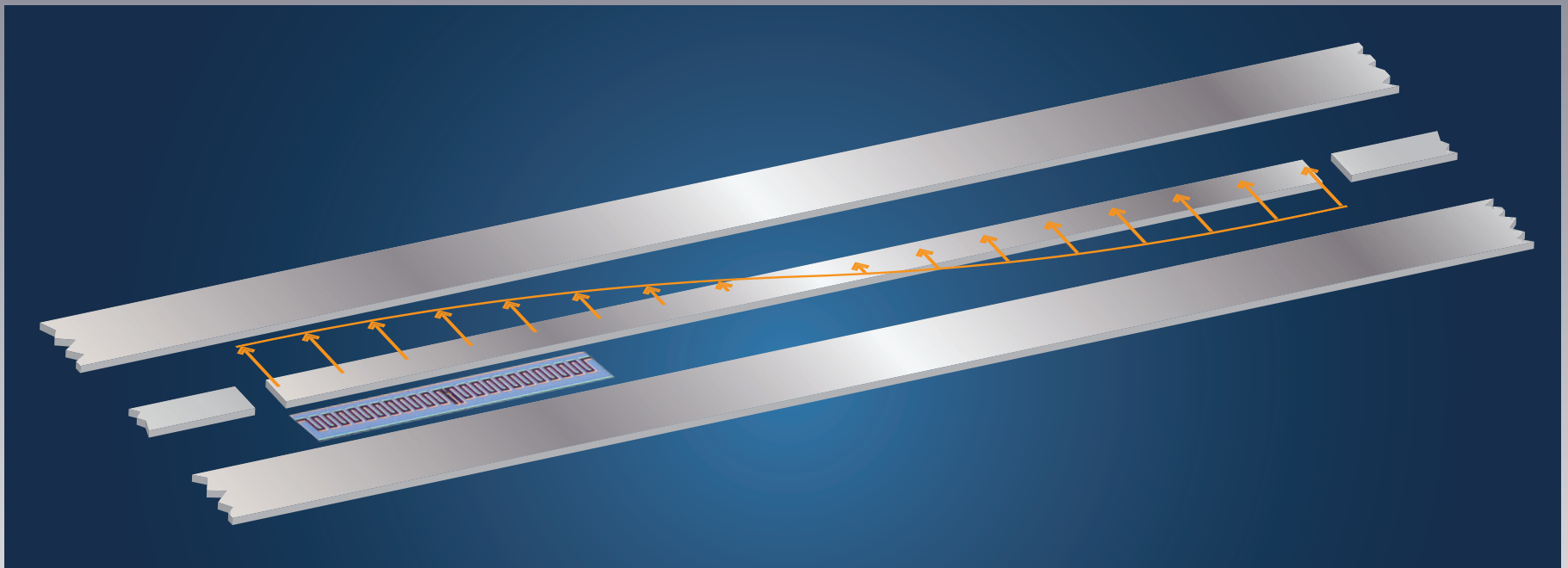
Lecture 11



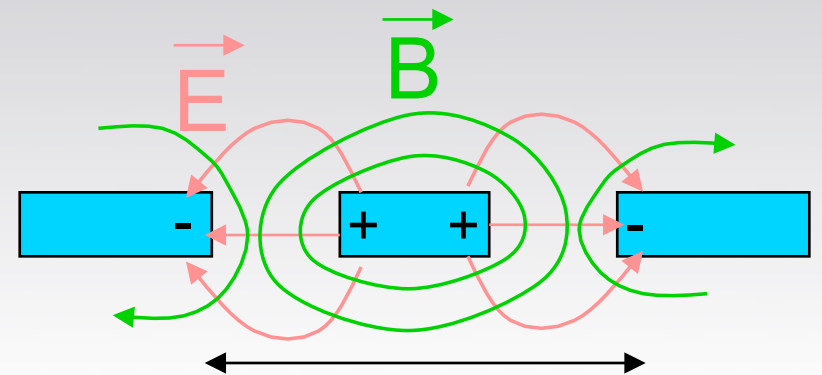
Coaxial Line



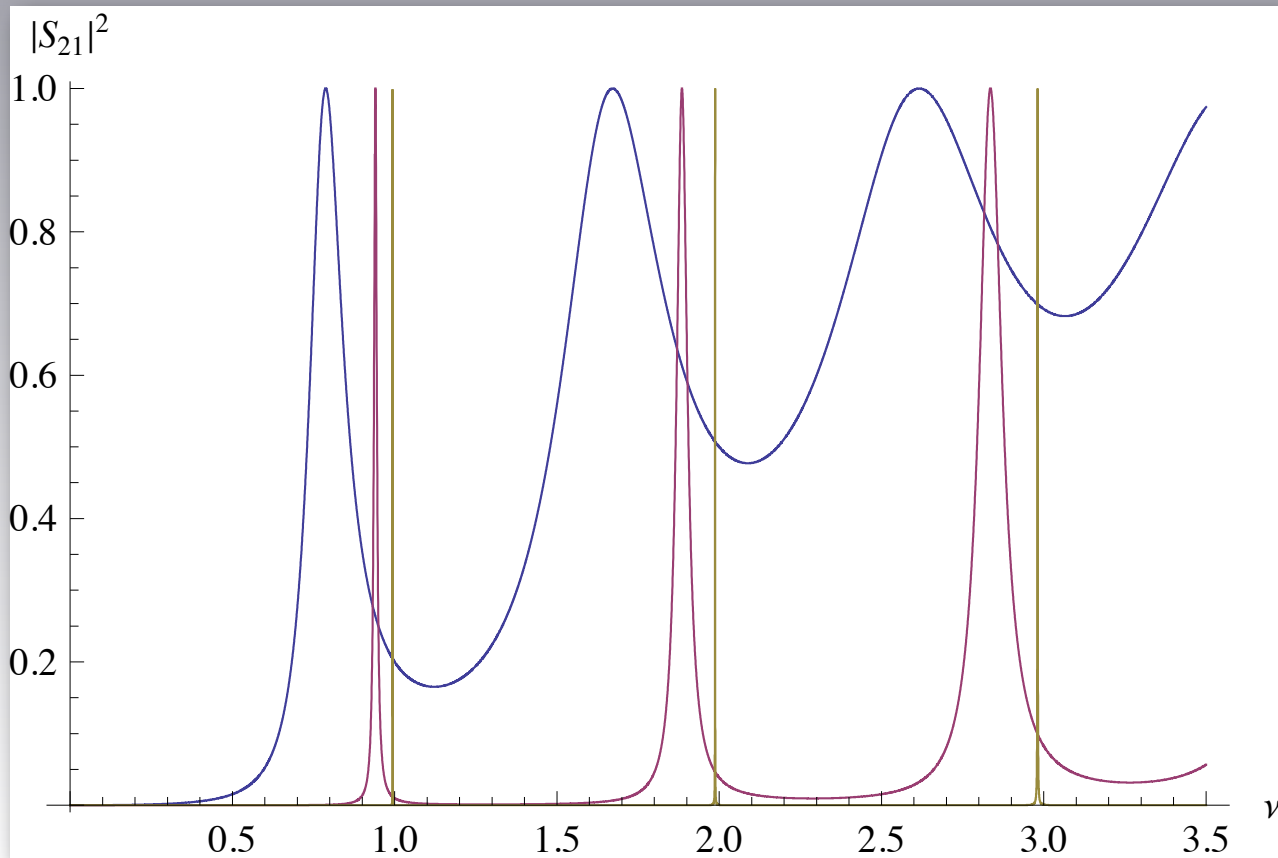
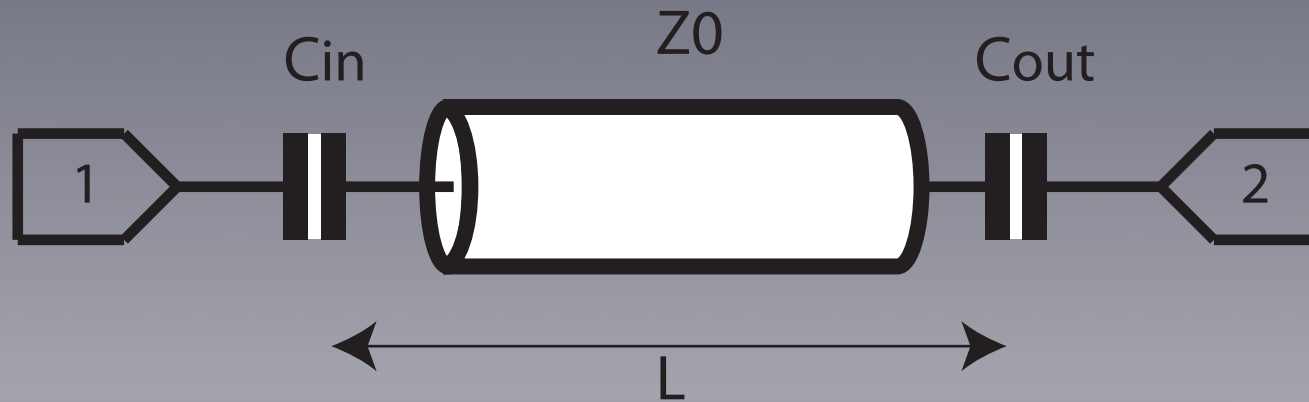
Transmission Line Resonator



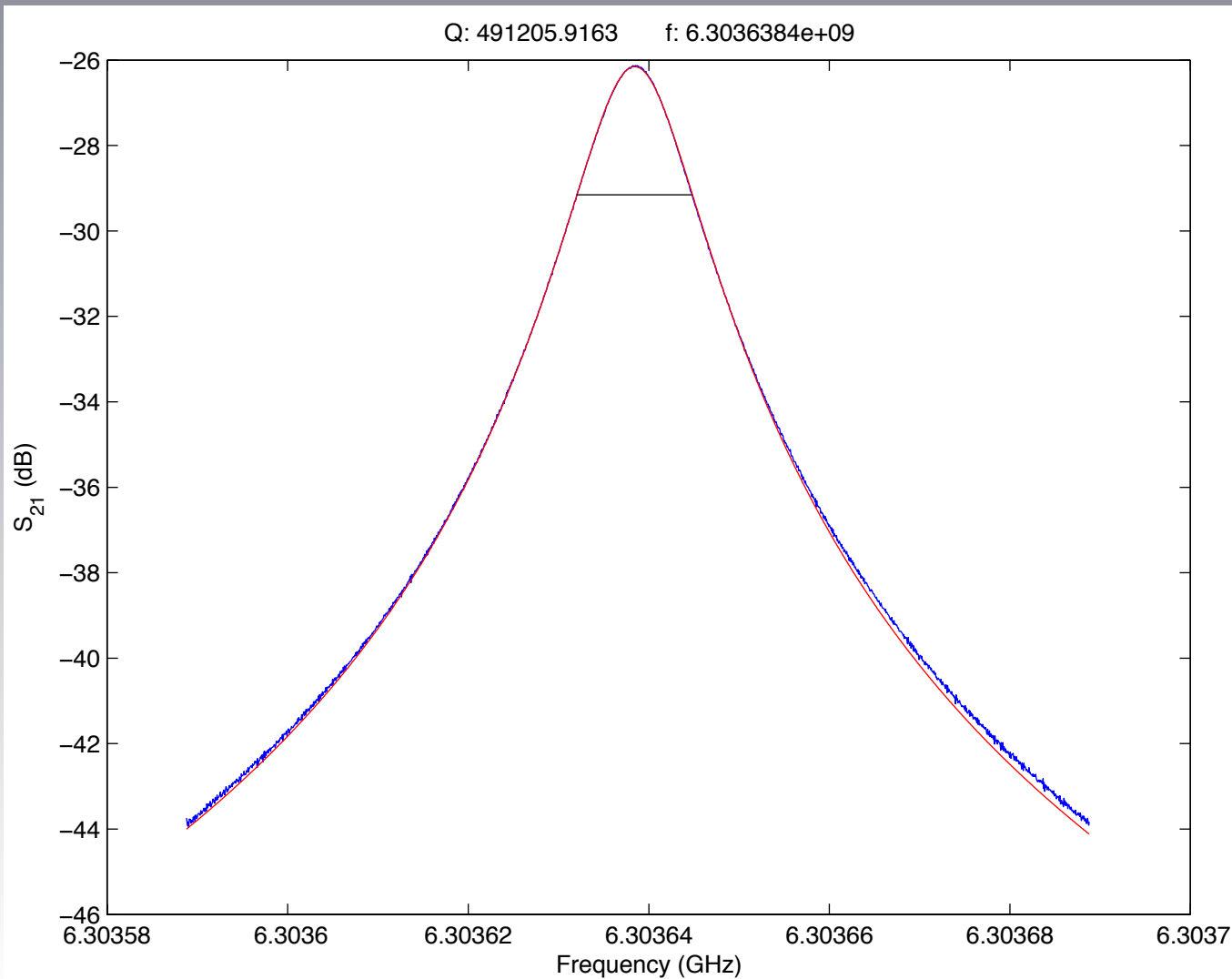
Coplanar Waveguide



Transmission Line Resonator



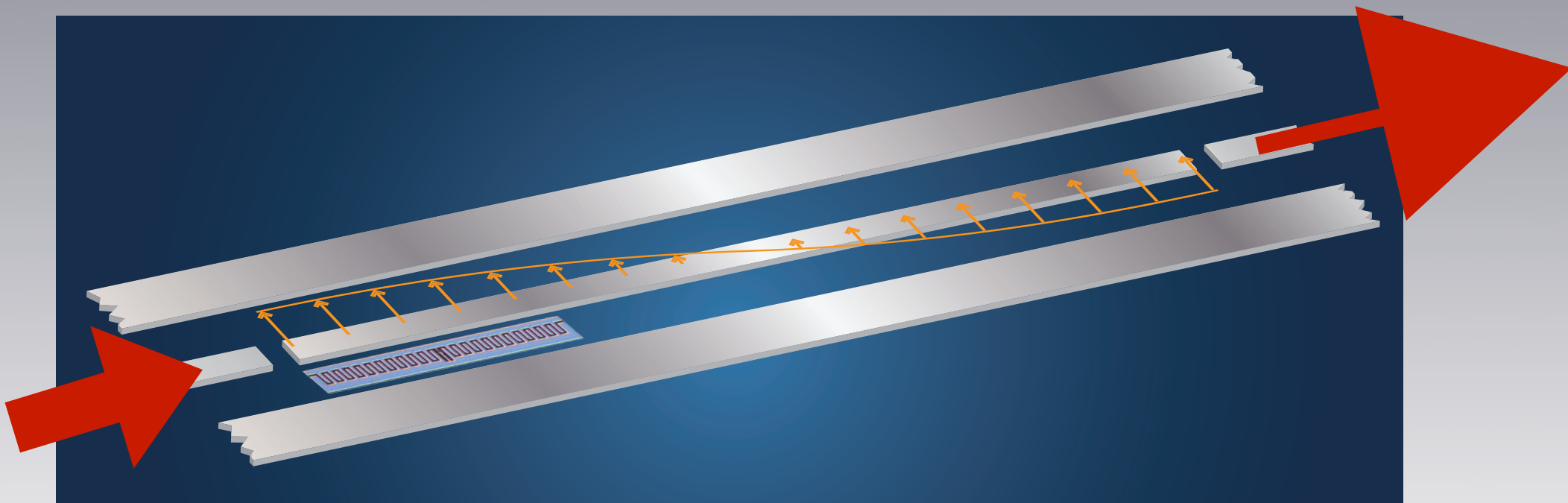
Superconducting Resonator



circuit QED

Drive

Amplifier

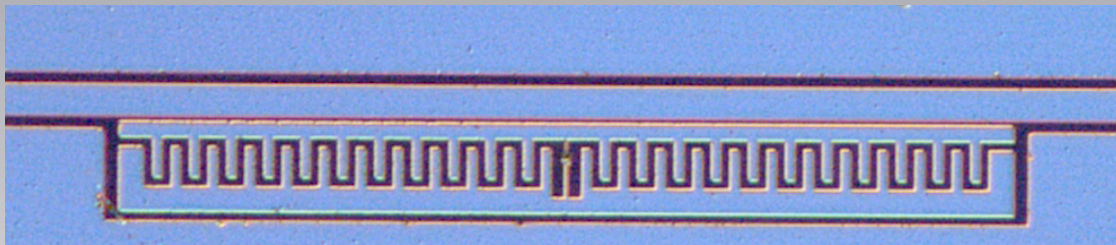
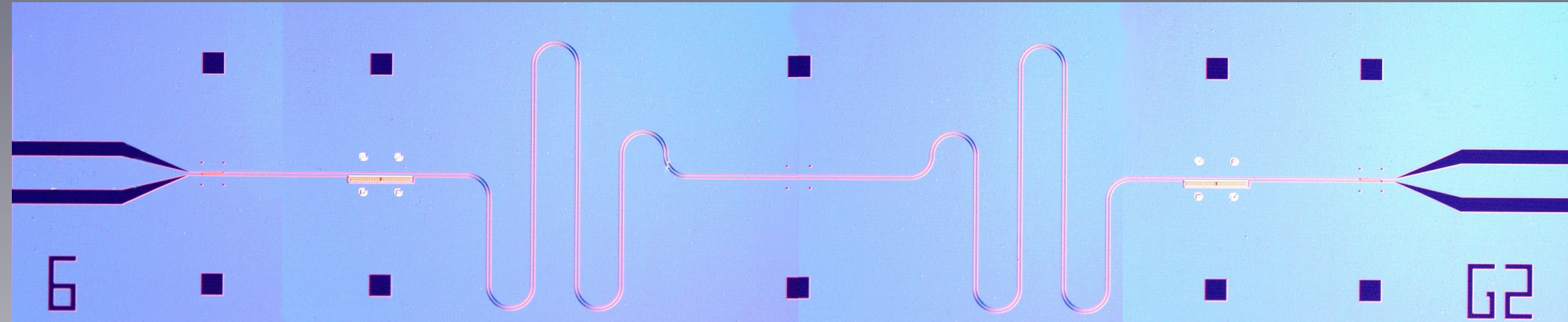


~ 6 GHz

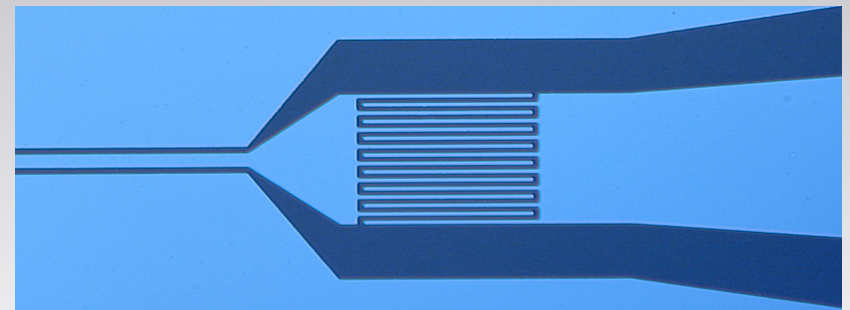
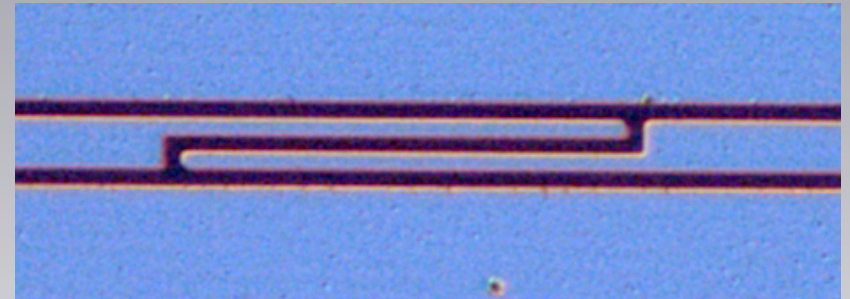
$$\langle n \rangle \ll 1$$

number of photons in the
resonator

The Chip

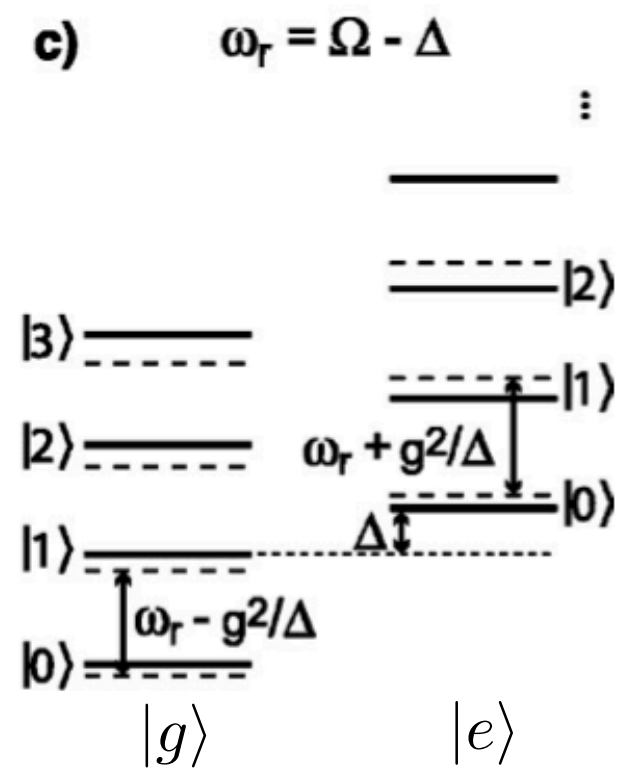
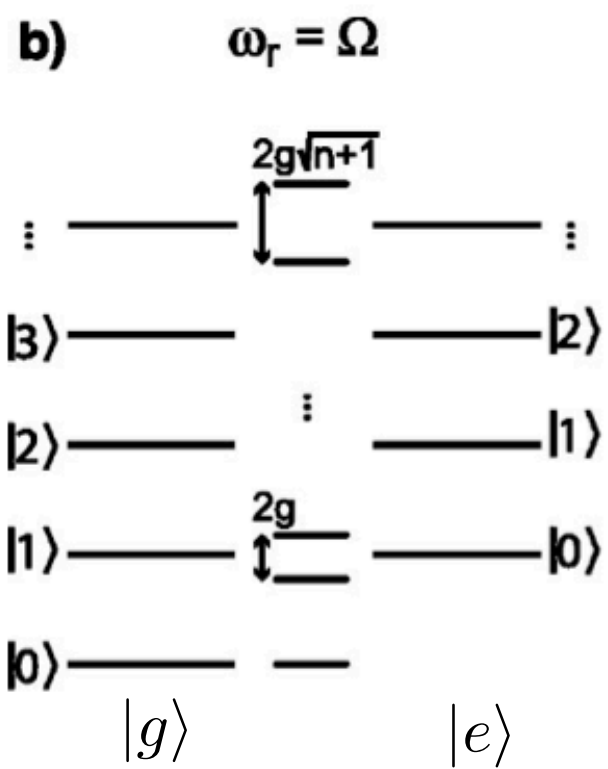
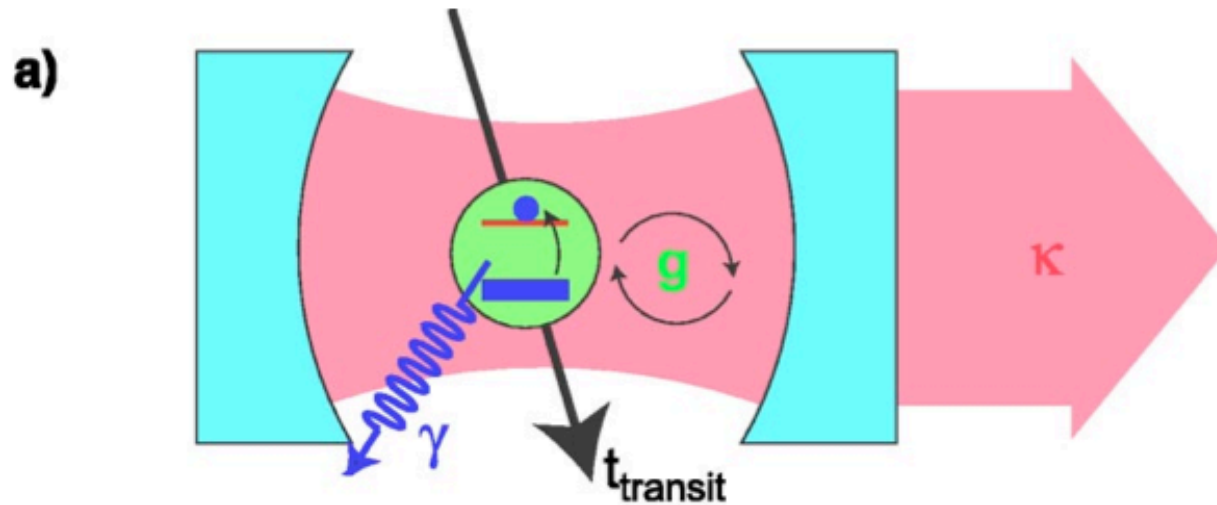


Qubit
'atom'

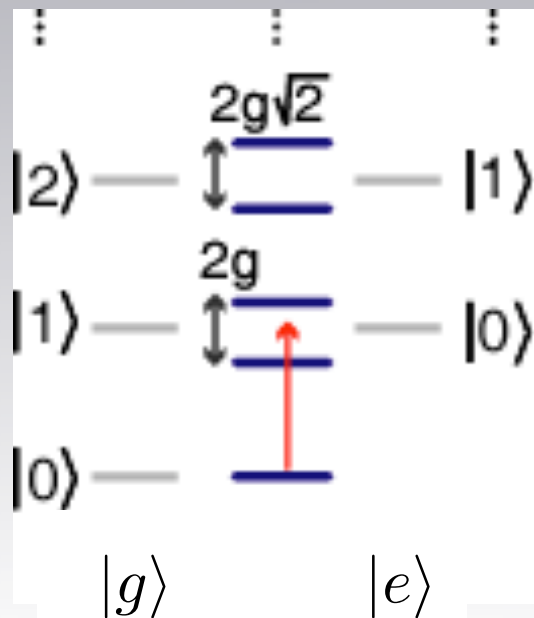
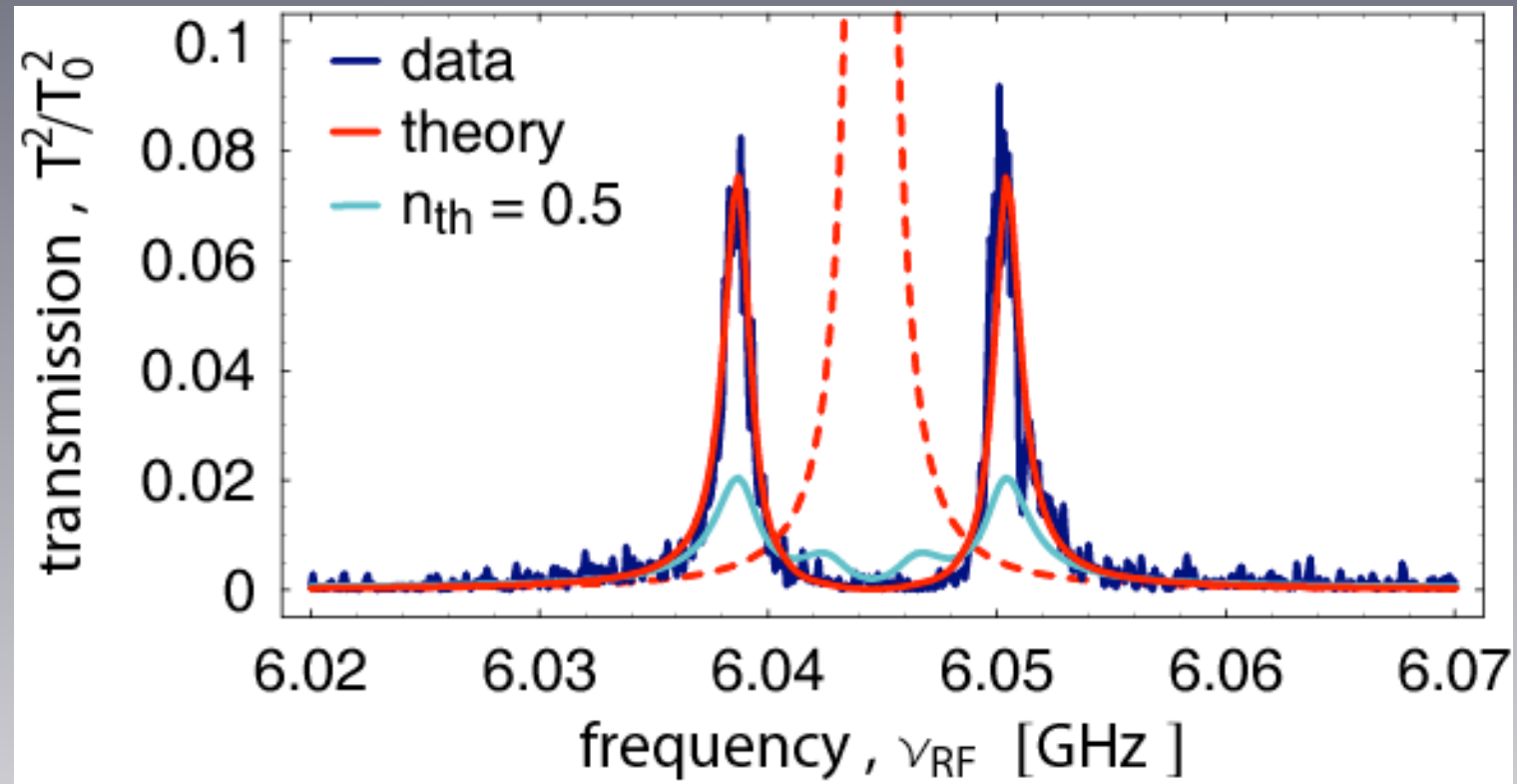


Coupling Capacitor
'mirror'

Jaynes-Cummings



Vacuum Rabi Splitting



$$|g\rangle |1\rangle - |e\rangle |0\rangle$$

quton

$$|g\rangle |1\rangle + |e\rangle |0\rangle$$

phobit