Lecture 3 - Quantum Amplification and Linear Detectors

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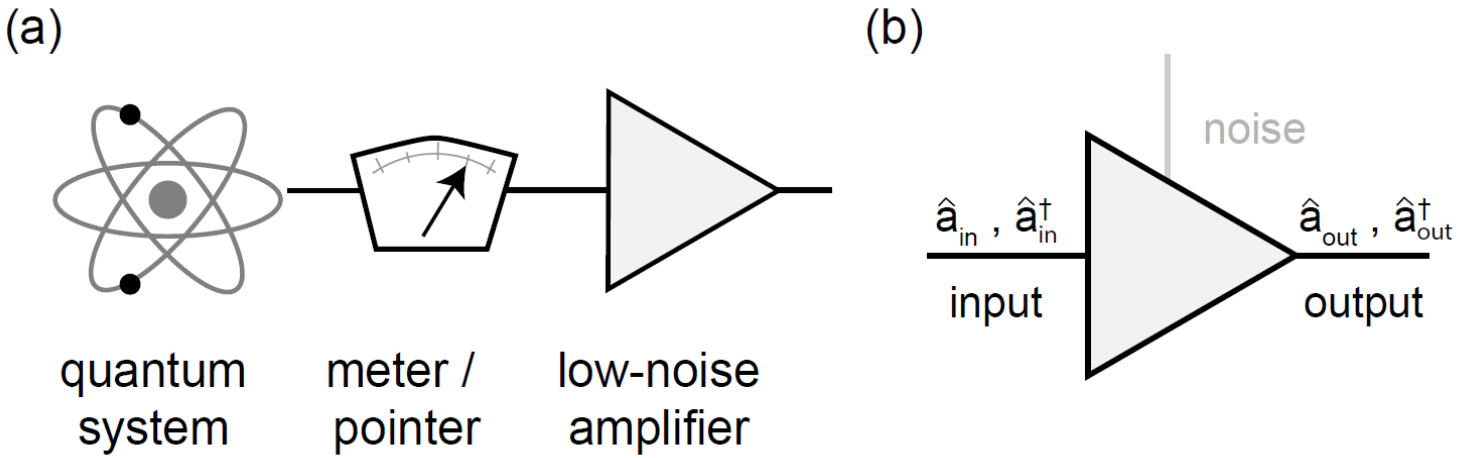
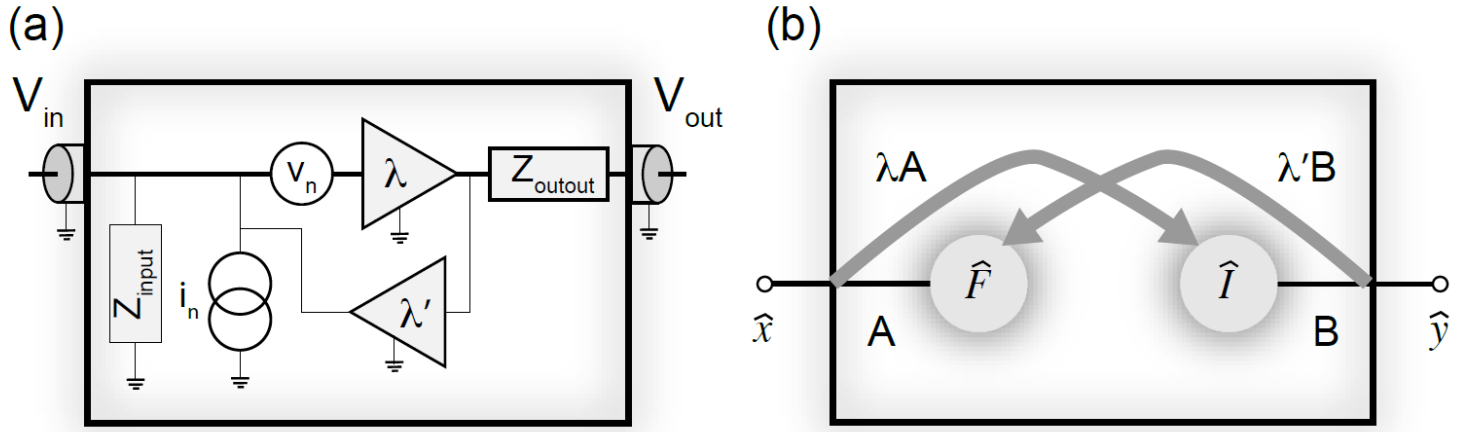
Quantum physics allows amplification, but puts stringent requirements on how the amplification can be carried out. Beginning with theoretical preliminaries of how much noise a quantum limited amplifier must add to the measured signal, I will overview the linear response theory of detectors, and give examples of amplifier designs in superconducting circuits.

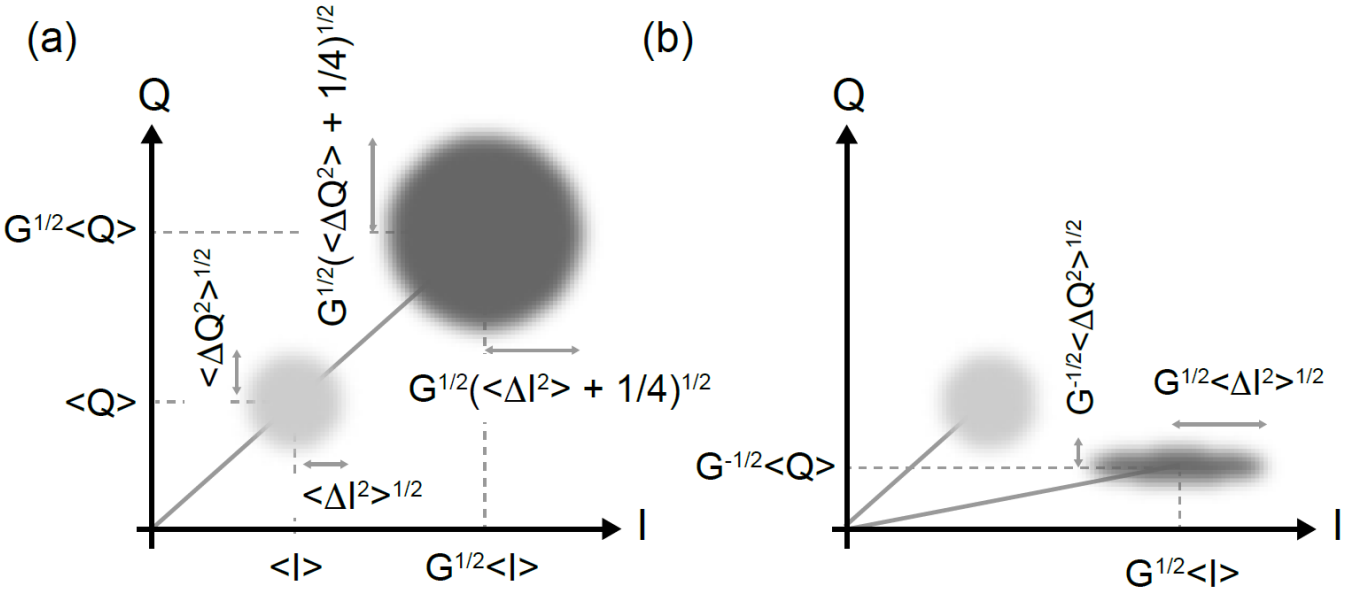
Lecture 3 - Figure 1



Lecture 3 - Figure 2

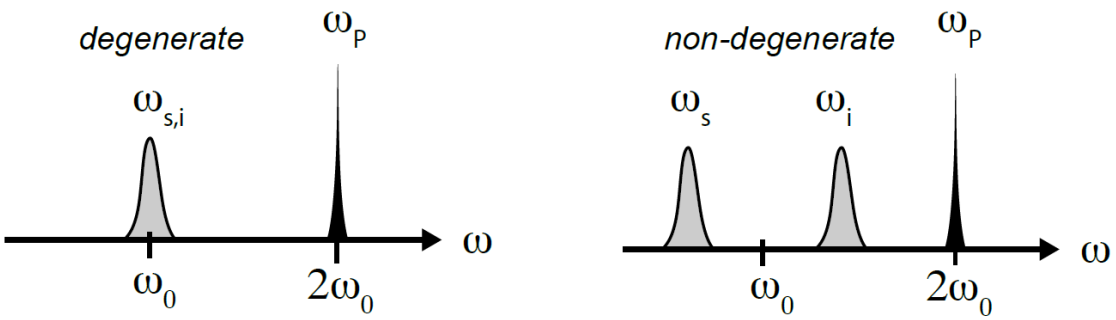


Lecture 3 - Figure 3

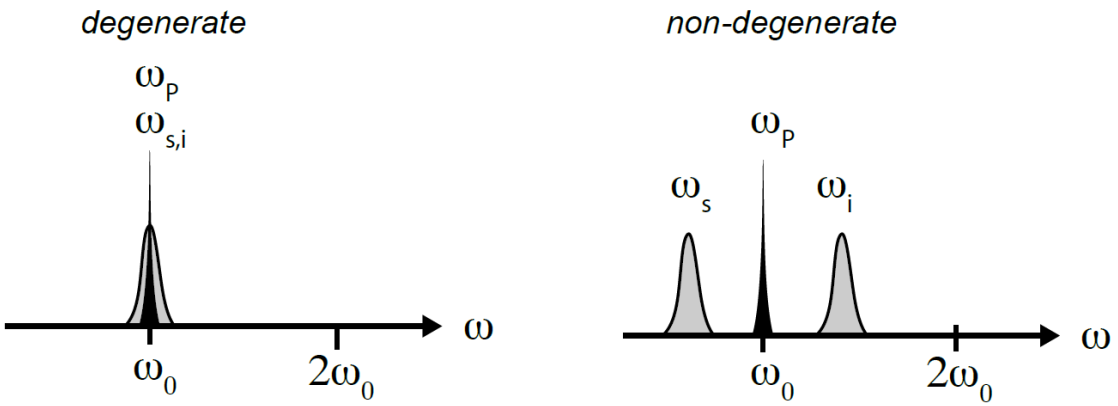


Lecture 3 - Figure 4

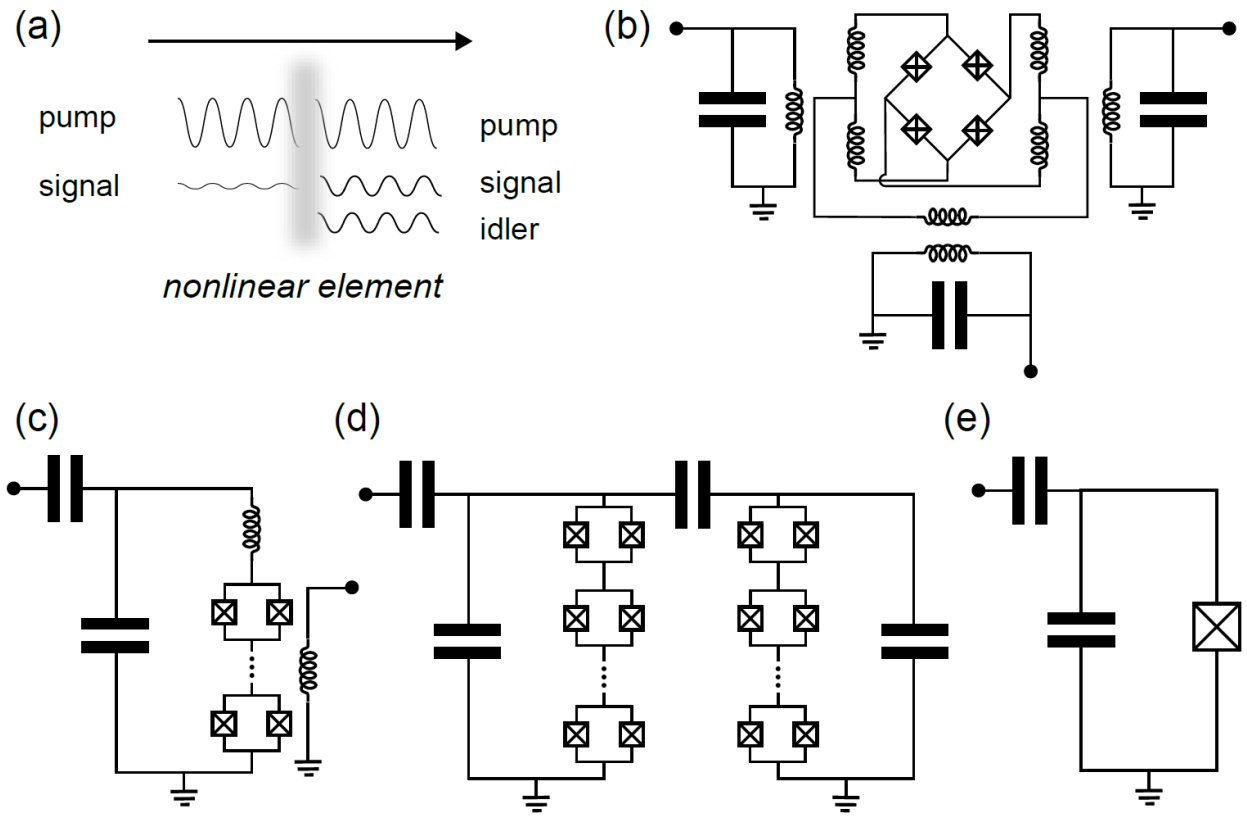
(a) Three-wave Mixing $\omega_P = \omega_s + \omega_i$



(b) Four-wave Mixing $2\omega_P = \omega_s + \omega_i$



Lecture 3 - Figure 5



Lecture 3 - Figure 6