# ECE 592-108
Superconducting Quantum Computers

Instructor(s): Dan Stancil, ddstanci@ncsu.edu

Objective or Description: This course concentrates on how the hardware of superconducting gate-based quantum computers works. We will begin with a brief introduction to quantum computing to motivate the necessary capability of the hardware, and then cover the underlying quantum mechanical concepts needed to understand the hardware. Next we will systematically cover the components of a superconducting gate-based quantum computer, with particular emphasis on transmon qubits.

Prerequisites: linear algebra, basic AC circuit theory, basic electromagnetic fields. Some prior knowledge of quantum mechanics would be helpful, but not essential.

Textbook: Principles of Superconducting Quantum Computers, D.D. Stancil and G.T. Byrd (online version available to NC State students at https://catalog.lib.ncsu.edu/catalog/NCSU5391730)

Topics: Introduction to quantum computing, the physics of one and two qubit gates, microwave component and system concepts, quantum circuit electrodynamics, physics and design of transmon qubits.
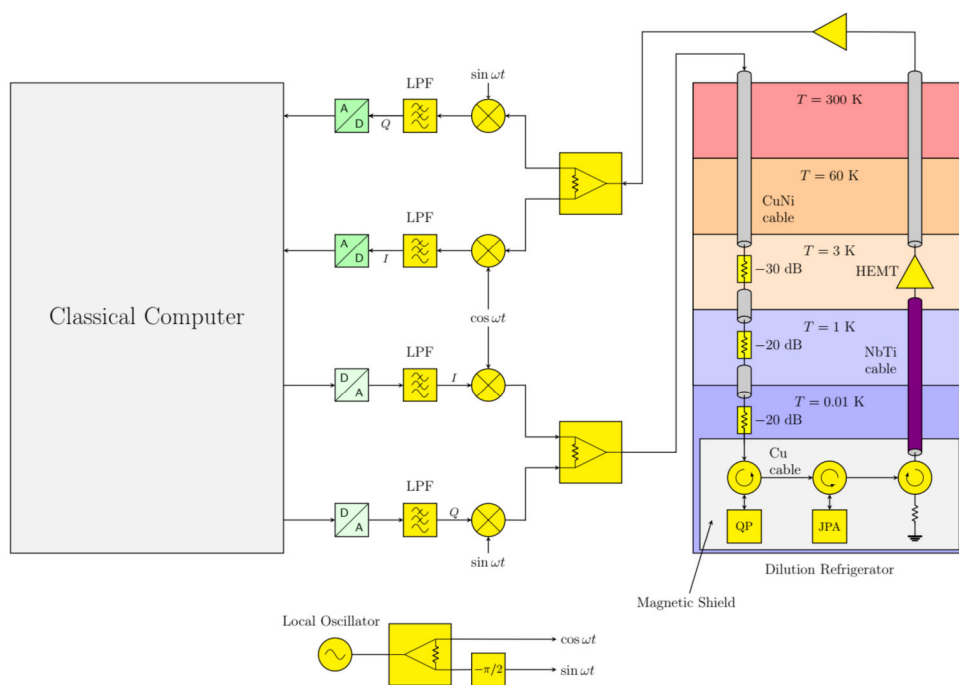
Grading: This class will use a form of "contract grading," where your grade depends solely on your completion of the assigned work. There will be six assignments, and the base grade will be determined by the number of assignments submitted.

Cross-listing in other departments: Physics PY 599-108