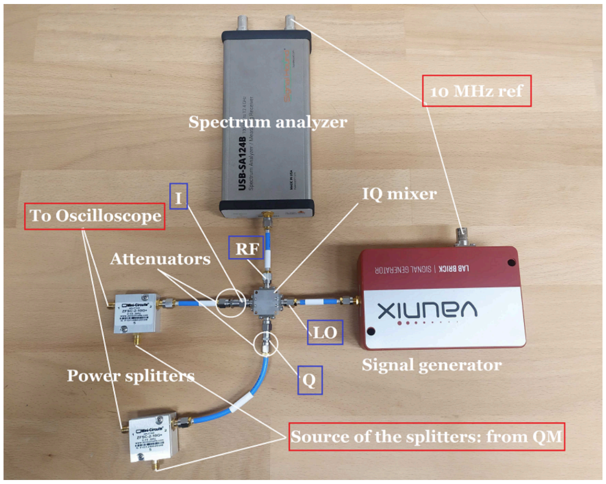

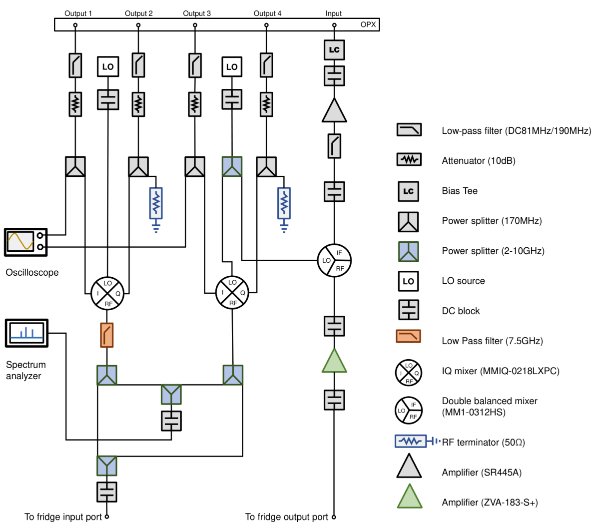

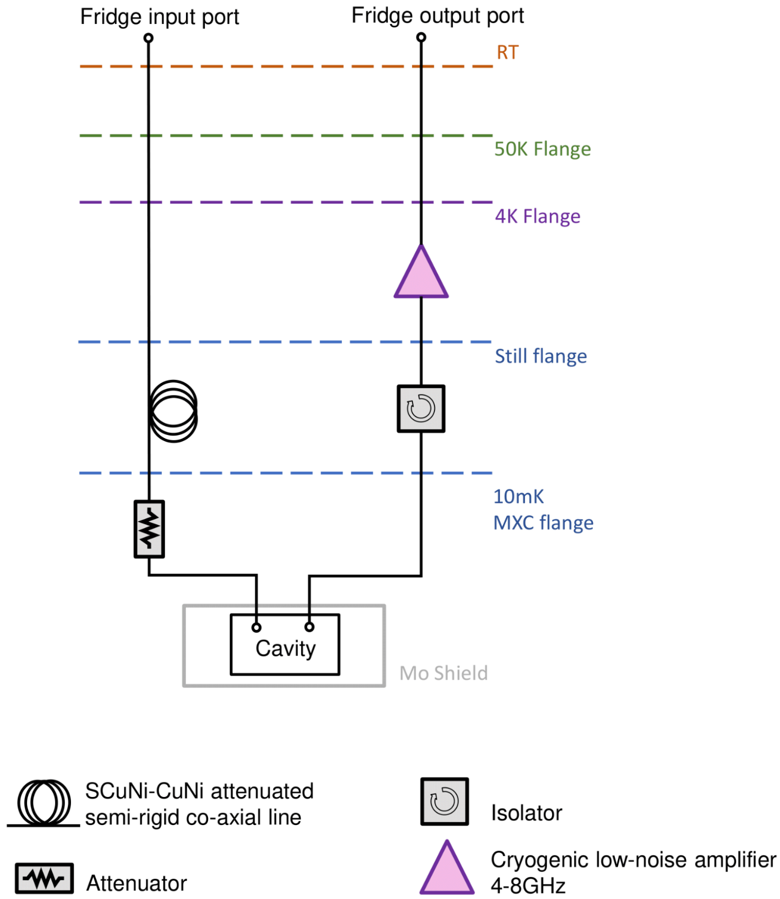

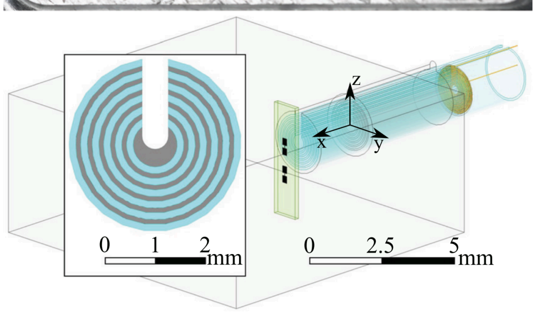

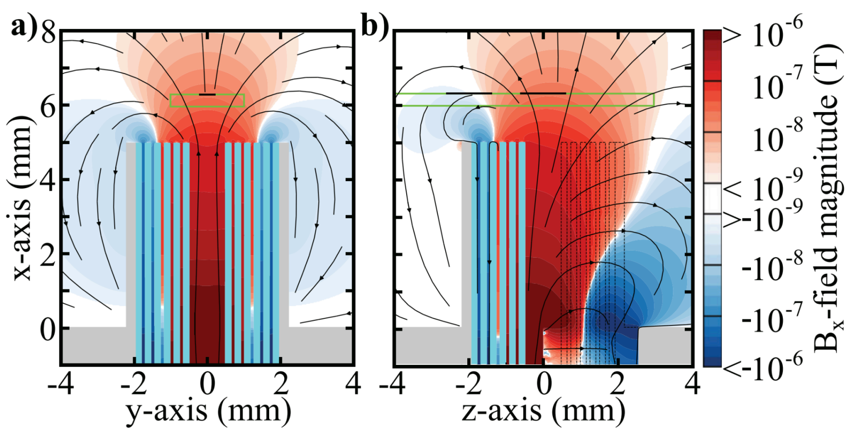

See Next Page for Documentation

Quantum System Configuration (Great Example of Hardware Setup):

Microwave control of a superconducting cavity:
qt5201.org/index.php/Microwave_control_of_superconducting_cavity_and_qubit

Single transmon qubit characterization:
qblox-qblox-instruments.readthedocs-hosted.com/en/master/applications/quantify/tuning_transmon_qubit.html

Coupled qubits characterization:
qblox-qblox-instruments.readthedocs-hosted.com/en/master/applications/quantify/tuning_transmon_coupled_pair.html

Cluster hardware to PC setup:
qblox-qblox-instruments.readthedocs-hosted.com/en/master/getting_started/setup.html

Sequencer setup:
qblox-qblox-instruments.readthedocs-hosted.com/en/v0.5.3/documentation/sequencer.html

Note: When a physical qubit device is installed in a cavity, it may not require a wire resonator since the drive signal for the qubit state transition is likely coming from a ported magnetron source or “magnetic hose”. However, one may opt to insert a kind of secondary, modular strip waveguide to experiment with the qubit response.

A local oscillator is able to create an unmodulated signal; it is constant. When combined together with a modulator, a wave packet, pulse shape, or pulse sequence can be achieved.

A local oscillator is an electronic oscillator used to generate a signal for the purpose of converting a signal of interest to a different frequency using a mixer. The main idea is to convert high frequency signals into lower, easily handled, frequencies. This frequency conversion process, also called heterodyning, produces the sum and difference frequencies from the frequency of the local oscillator and frequency of the input signal.

A local oscillator is an electronic oscillator used with a mixer to change the frequency of a signal. This frequency conversion process, also called heterodyning, produces the sum and difference frequencies from the frequency of the local oscillator and frequency of the input signal. The purpose of a local oscillator is to generate a sinusoidal signal including a frequency so that the receiver is capable of generating the accurate intermediate frequency or resulting frequency for further amplification as well as conversion into audio detection. Local oscillators are used in the superheterodyne receiver, the most common type of radio receiver circuit. They are also used in many other communications circuits such as modems, cable television set top boxes, frequency division multiplexing systems used in telephone trunklines, microwave relay systems, telemetry systems, atomic clocks, radio telescopes, and military electronic countermeasure (anti-jamming) systems.

(1) Local oscillator - Wikipedia. en.wikipedia.org/wiki/Local_oscillator
(2) Local Oscillator : Block Diagram, Circuit, Frequency & Its Uses - ElProCus. www.elprocus.com/local-oscillator
(3) What does local oscillator mean? www.definitions.net/definition/local%20oscillator.

An IQ mixer, or In-phase and Quadrature mixer, is a device that takes a modulated RF signal as input and generates I/Q signals as outputs by beating the RF input with the LO (Local Oscillator) input1. The I and Q ports will have output designated as IF1 and IF2 respectively.

The purpose of an IQ mixer is to allow for more flexible and efficient data transmission and reception. It can eliminate the need for a bandpass filter, making the transceiver small and frequency agile2. This means that the LO can be swept to any frequency that is in band for both mixers without penalty from nearby channels.

In an IQ mixer, the ‘sideband rejection’ refers to how well the I signal will be suppressed in the Q channel and vice versa. This is typically around 20-30 dB for very good broadband IQ mixers.

IQ mixers are based on vectorial cancellation, and as such are subject to the limits of phase and amplitude balance. They are sometimes used in systems where you want to select either the upper or lower sideband, which is why they are sometimes called a single-sideband mixer. They can also perform image rejection.

In summary, an IQ mixer is a key component in many RF systems, providing a method for efficient and flexible data transmission.

Suppl. Information:
Fast flux control of 3D transmon qubits using a magnetic hose: pubs.aip.org/aip/apl/article/118/1/012601/39915/Fast-flux-control-of-3D-transmon-qubits-using-a - copyrighted

Computer simulation of magnetic hose: physicsworld.com/a/introducing-the-magnetic-hose

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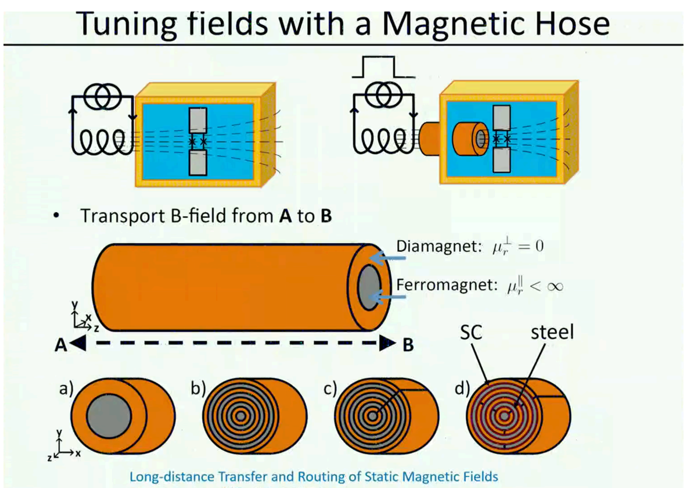
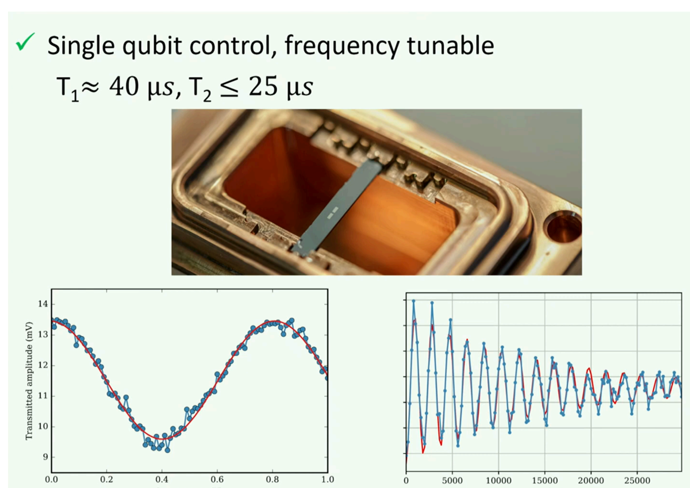
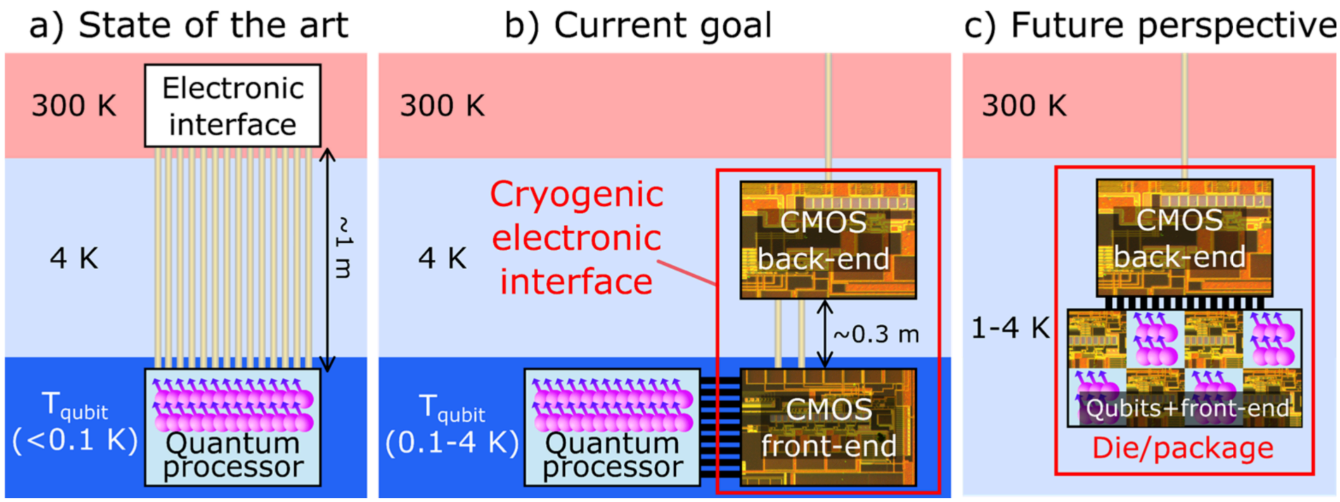
More Suppl. Information



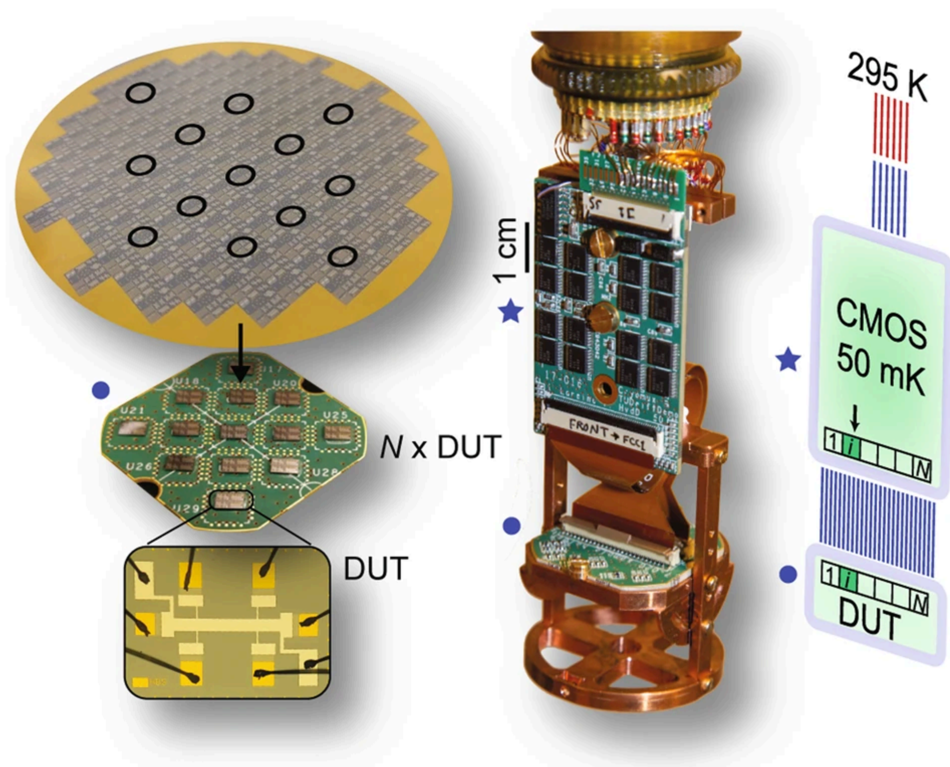


From: Superconducting qubits for analogue quantum simulation

Even More Suppl. Information:



From: Cryo-CMOS Interfaces for Large-Scale Quantum Computers (ieeexplore.ieee.org/document/9372075)



From: Multiplexed quantum transport using commercial off-the-shelf CMOS at sub-kelvin temperatures (www.nature.com/articles/s41534-020-0274-4)

From: QBlox