# Cirq

## An open source framework for programming quantum computers

Cirq is a Python software library for writing, manipulating, and optimizing quantum circuits, and then running them on quantum computers and quantum simulators. Cirq provides useful abstractions for dealing with today's noisy intermediate-scale quantum computers, where details of the hardware are vital to achieving state-of-the-art results.With the help of cirq we can develop a circuit. A circuit is a collection of moments. A moment is a collection of operations that all act during the same abstract time slice Cirq comes with built-in simulators, both for wave functions and for density matrices. These can handle noisy quantum channels using monte carlo or full density matrix simulations. In addition, Cirq works with a state-of-the-art wavefunction simulator: qsim.

In Cirq, the main gates are the:

**cirq.MeasurementGate**-This is a measurement in the computational basis. This gate can be applied to a variable number of qubits.

**cirq.X / cirq.Y / cirq.Z** :The Pauli gates X, Y, and Z which rotate the state by one half-turn around the X,Y or Z axis respectively

**cirq.CZ** :The controlled-Z gate. A two qubit gate that phases the $|11\rangle$ state

**cirq.CNOT**: The controlled-X gate. This gate swaps the $|11\rangle$ and $|10\rangle$ states

**cirq.SWAP**: The swap gate swaps the $|01\rangle$ and $|10\rangle$ states