A group of people are seated at a table in a restaurant, enjoying a meal. The table is set with several white plates and bowls containing various dishes, including salads, vegetables, and meat. A person's hand is visible holding a fork over a bowl of salad. The background is slightly blurred, showing other diners and the restaurant's interior. The overall atmosphere is warm and inviting.

# Welcome to Quantum Cuisine

An exclusive culinary experience  
where we pair quantum computing  
with wine tasting.

The background of the slide is a blurred photograph of a restaurant table. Several wine glasses are visible, some in the foreground and others further back. There are also silverware items like forks and spoons on the table. The lighting is warm and out of focus, creating a bokeh effect with soft, glowing circles of light in the background.

# Appetizer - Quantum Terminology

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Before we dive into the main course, let's familiarize ourselves with some quantum lingo.



# Qubits

what it is and how it's controlled

Superconducting:

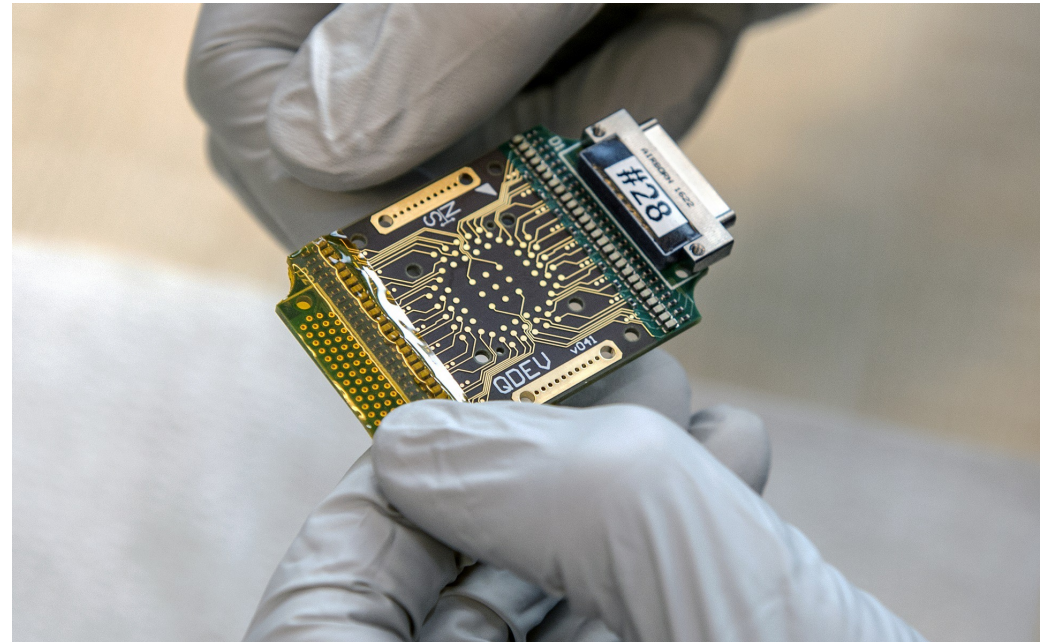
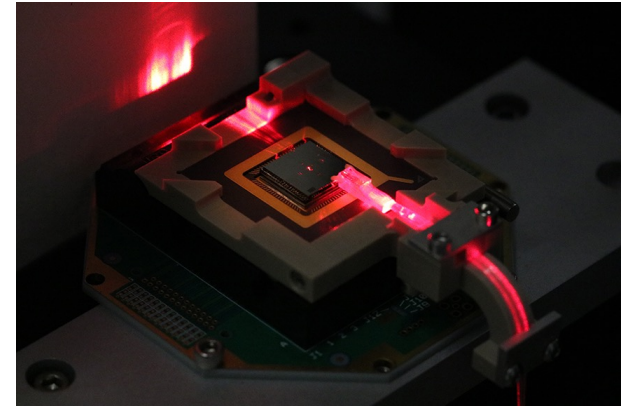
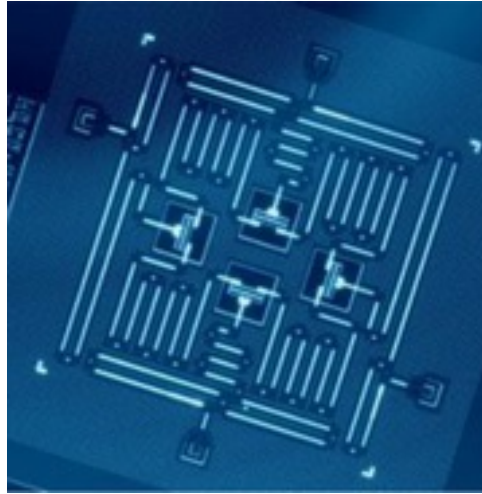
- circuits that can carry an electric current without resistance
- microwave pulses

Trapped Ion:

- individual ions that are trapped and isolated in electromagnetic fields
- lasers

Topological:

- anyons or other exotic quasi-particles
- “braiding” the particles around each other in a specific pattern



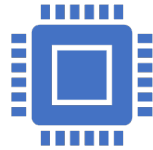
# Mechanics



## Superposition:

the ability of a quantum system to exist in multiple states simultaneously

a superposition of 0 and 1  
is not both 0 and 1,  
neither 0 nor 1, not 0, and  
not 1

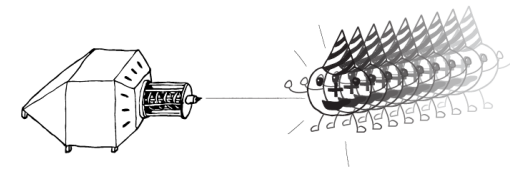


## Entanglement:

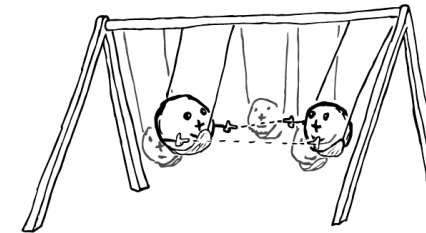
a physical resource that  
allows qubits to be in  
correlated states,  
necessary for certain  
quantum algorithms and  
protocols

## Quantum Gates

Fine-tuned lasers can  
control the state of a  
single qubit



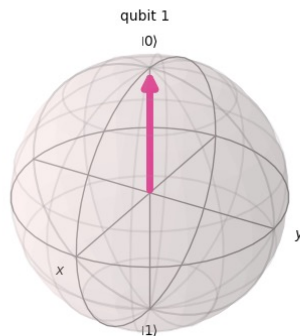
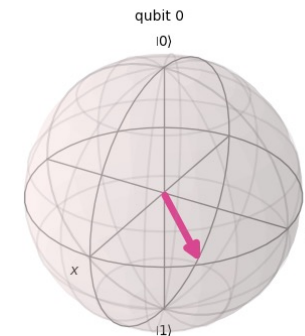
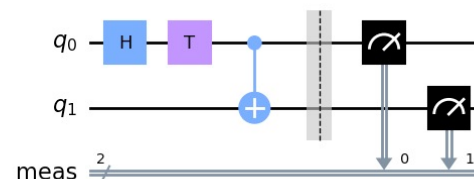
To perform 2-qubit operations,  
trapped ions interact via  
vibrations felt by their charges



And they can even become  
entangled!!

# Software

- Qubit
  - the quantum analog of a classical bit, capable of existing in a superposition of states
- Quantum Gate
  - an operation that changes the state of a qubit or set of qubits, analogous to a logical gate in classical computing
- Quantum State
  - the complete description of a quantum system, usually expressed as a wavefunction or density matrix
- Measurement
  - the process of observing a quantum system, causing it to collapse into one of its basis states
- Bloch Sphere
  - a graphical representation of the state space and state vector of a single qubit
- Quantum Circuit
  - a sequence of quantum gates and measurements that performs a specific computation
- Quantum Algorithm
  - a step-by-step procedure for solving a problem using quantum computing

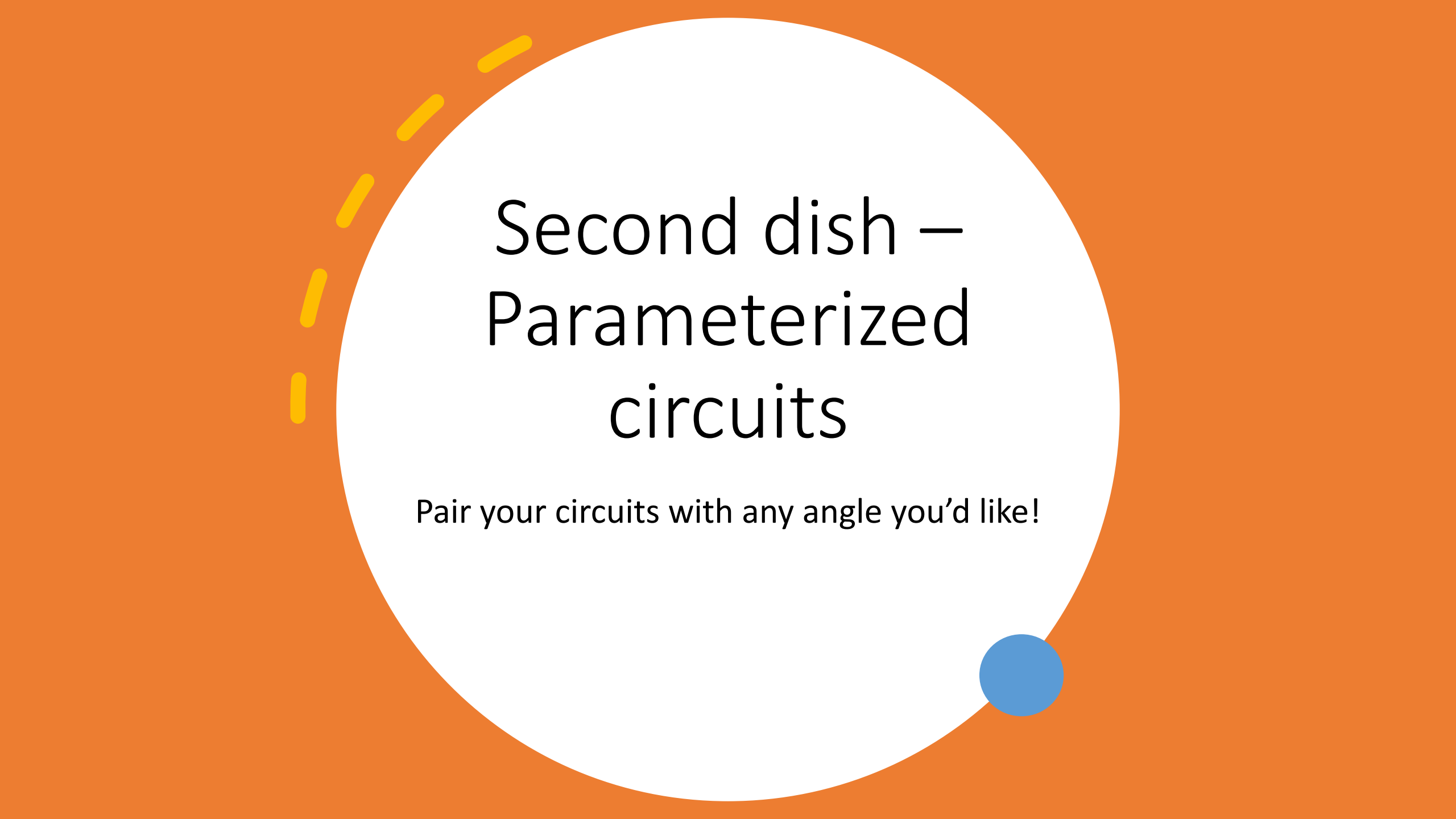




# Starter – A simple quantum circuit

Comes with a side of visualizations





# Second dish – Parameterized circuits

Pair your circuits with any angle you'd like!



# Main dish - quantum optimization

Enjoy wine while we have  
quantum tell us how much to  
enjoy it







# Optimizer App

Or you can order to-go and have all the food prepared and delivered

# Dessert

1. [Trapping Ions for Quantum Computing](#) – Diana Prado Lopes Aude Craik
2. [Qiskit Textbook](#) – IBM Quantum
3. [Quantum Computing: An Applied Approach](#) – Jack Hidary