#flo #inclass

---

1 | **Fantastic qubits and where to find them!**

elevator pitch: can realize every aspect of a quantum computer using atoms?

just having qubits is not enough, also needs to meet other critera

q: what is a qubit? a: any quantum mechanical system that has two wavefolds that you can entangle?

1.1 | **finding a qubit**

- different orbits of an electron in an atom
  - can use the different orbits of electrons in a atom to mimic the quantum properties of a qubit
- only the first ring is stable
  - light is emitted out of the atom when they jump down orbits, which we can detect!
  - but how do we move them between orbits?
    - hit them with the opposite light – just like phase transitions
- lower energy state is better for base state, so we choose the first orbit
- in the real world you can have more than one ground state! which is how we can have two stable states at once

1.2 | **isolating the qubit**

- we gotta isolate, and also interact.
  - put them in a vaccum and them hit them with lasers
    - known as optical tweezers – think of the intersection of multiple beams
- how does light actully prevent atoms from moving with light?
  - if you use two lasers that arnt exactly resonant, it creates a pocket of lower energy?
- can also do something called optical pumping
  - which allows us to use auxillary qubits to get over the fact that all our gates are unitary, hermitatian, and thus invertible
- we can use 1Q gates to move a qubit anywhere else on the blohck sphere
-