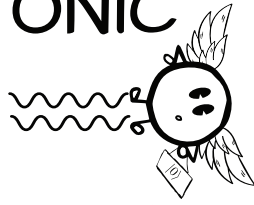
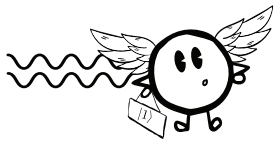


# PHOTONIC

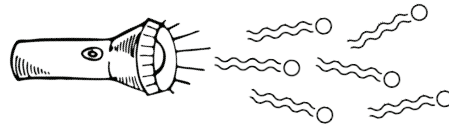


# QUANTUM COMPUTERS

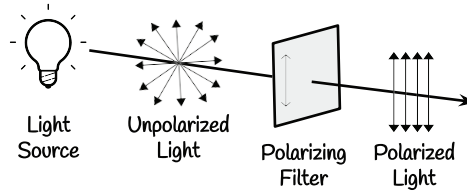


## PHOTONS

Light is made of particles called photons which are always in motion!



Filters can polarize light.



## "FLYING" QUBITS

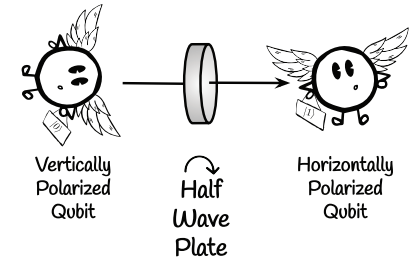
ONE photon stores ONE qubit

A vertically polarized qubit is  $|0\rangle$

A horizontally polarized qubit is  $|1\rangle$

## QUANTUM GATES

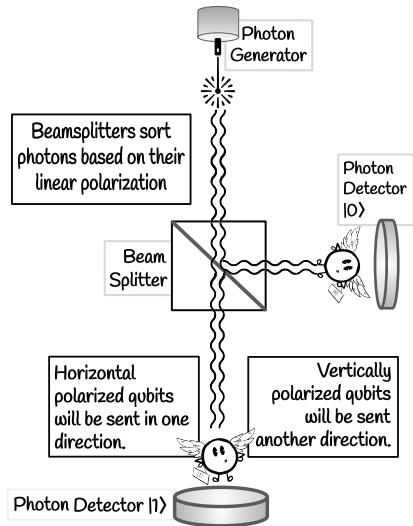
Waveplates are used to change the polarization of a photon.



Rotates polarization of linearly polarized light

## MEASUREMENT

A beamsplitter and photon detectors are used to measure photonic qubits.



## ADVANTAGES

1. Stable!
  - Able to hold a quantum state for a relatively long period of time
2. Easy long-distance communication
  - b/c photons are already moving!
3. Most components work at room temperature
  - Does not require large dilution refrigerators
4. Cheap long-distance communication
  - Compatible with existing fiber-optic networks

## CHALLENGES

1. Time intensive!
  - You need to change the hardware to change the software
2. Multi-qubit gates are difficult to build
  - Photons do not interact with one another!

FIND MORE QUANTUM COMPUTING ZINES HERE:

<https://www.epiqc.cs.uchicago.edu/resources/>

JANUARY 2023

This work is funded in part by EPIQC, an NSF Expedition in Computing, under grant 1730449

