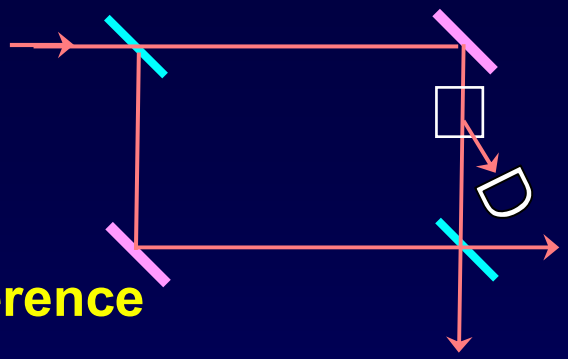
FYI: More Quantum Weirdness



Consider the following interferometer:

- **photons are sent in one at a time**
- **the experimenter can choose to**
  - **leave both paths open, so that there is interference**
  - **activate switch in the upper path, deflecting that light to a counter**
- **What does it mean?**
  - **Switch OFF → interference → wave-like behavior**
  - **Switch ON → detector "click" or "no click" and no interference → particle-like behavior (trajectory is identified)**

- **What is observed? What kind of behavior you observe depends on what kind of measurement you make. Weird.**

Principle of Complementarity: You can't get perfect particle-like and wave-like behavior in the same setup.

- **It gets worse! In the "*delayed choice*" version of the experiment that was done, the switch could be turned ON and OFF *after* the photon already passed the first beam splitter! The results depended only on the state of the switch when the photon amplitude passed through it!**