

# Measurement

How does what we measure determine whether we observe wave or particle properties?

Waves have wavelength,  $\lambda$ , and frequency,  $f$ . So, if we measure momentum (wavelength) or energy (frequency), we have observed the wave properties of our object.

Particles have position (and trajectories). If we measure position (e.g., which slit it went through) we have observed a particle property. That's why the "which slit" measurement destroys the interference pattern.

Note that particle and wave properties are incompatible. One can't simultaneously measure both wavelength and position. This is the basis of Heisenberg's "uncertainty principle". (more later)