

Quantum mechanics main points

Particle nature of light, photons.

Wave nature of particles, de Broglie waves.

For both kinds of *quantons*, $E = hf = \hbar\omega$ and $p = h/\lambda = \hbar k$.

Quanton 2-slit problem

particle and wave aspects

calculation with beam of definite momentum quantons

Wave function

$$\psi(x) = \langle x | \psi \rangle$$

$$P(x) dx = |\psi(x)|^2 dx$$

$$\langle x | p \rangle \propto e^{ipx/\hbar}$$

Uncertainty relation $\Delta x \Delta p \geq \hbar/2$

Basic rules (see the e-handout *Quantum mechanics I* for the full story)

For each process, there is an amplitude a , which is a complex number.

The probability for the process is $P = |a|^2 = a^*a$.

If the *same* process can happen in several ways, the amplitudes **add**.

If a given way is composed of several steps, the amplitude for the way is the product of the amplitudes for each step.

“It’s the superposition principle!”