Matter Waves

We described one of the experiments (the photoelectric effect) which shows that light waves also behave as particles. The wave nature of light is revealed by interference - the particle nature by the fact that light is detected as quanta: "photons".

Photons of light have energy and momentum given by:

$$E = hf \quad \text{and} \quad p = h/\lambda$$

Prince Louis de Broglie (1923) proposed that particles also behave as waves; i.e., for all particles there is a quantum wave with frequency and wavelength given by the same relation:

$$f = E/h \quad \text{and} \quad \lambda = h/p$$