

Checklist (HL)

Higher level (HL)

What you should know

After studying this subtopic, you should be able to:

- Describe how the photoelectric effect is evidence for the particle nature of light and understand the concept of threshold frequency.
- Understand the concept of work function and use the equation for maximum kinetic energy of photoelectrons:

$$E_{\max} = hf - \phi$$

- Describe how Compton scattering of light is evidence for the particle nature of light and use the equation for the shift in photon wavelength:

$$\begin{aligned}\lambda_f - \lambda_i &= \Delta\lambda \\ &= \frac{h}{m_e c} (1 - \cos \theta)\end{aligned}$$

- Explain that matter exhibits wave—particle duality.
- Describe how the diffraction of particles is evidence for the wave nature of matter.
- Explain the concept of the de Broglie wavelength of matter and use the equation:

$$\lambda = \frac{h}{p}$$

