

Energy Levels

Physics

Why atoms emit at specific wavelengths only.

A photon is emitted or absorbed when an electron moves between levels; its energy equals the difference.

$$\Delta E = hf = hc/\lambda$$

Emission

Bright line.

Electron falls, photon out

Absorption

Dark line.

Electron rises, photon in

Larger ΔE

Shorter wavelength

THE COMMON MISTAKE

✗ **Treating levels as evenly spaced**

✓ **They converge at higher energy**

In hydrogen, levels go as $-13.6/n^2$ eV, so the gaps shrink rapidly and converge at the ionisation limit.

Each element has a unique line spectrum. That is how the composition of stars is determined from their light.