

Blackbody Radiation

Physics

The problem that started quantum theory.

A hot body radiates with a spectrum whose peak shifts to shorter wavelengths as temperature rises.

$$\lambda_{\text{max}} T = 2.9 \times 10^{-3} \text{ m} \cdot \text{K} \cdot P = \sigma A T^4$$

Sun, 5800 K

Green-yellow.

Peak around 500 nm

Double the temperature

T^4 .

16× the power

Cool star

Appears red.

Peaks in the infrared

THE COMMON MISTAKE

✗ **Expecting classical theory to work here**

✓ **It fails badly at short wavelengths**

The Rayleigh-Jeans law predicts unbounded energy in the ultraviolet — the reason Planck introduced quantised energy.

Wien's law is how a star's surface temperature is read from its colour alone.