PART 2. TECHNOLOGY

Chapter 3: Light sources

3.1 Production of radiation

3.1.1 Incandescence

When an object is heated to a high temperature, the atoms within the material become excited by the many interactions between them and energy is radiated in a continuous spectrum. The exact nature of the radiation produced by an idealised radiator, known as a black body, was studied by Max Planck at the end of the 19th century and he developed the following formula to predict the radiation produced

$$M_{e\lambda}^{th} = \frac{c_1}{\lambda^5 \left[\exp(c_2/\lambda T) - 1\right]}$$

where: $M_{e\lambda}^{th}$ is the spectral radiant exitance, c_1 and c_2 are constants, with values of 3.742×10^{-16} W/m^2 and 1.439×10^{-2} m·K respectively.
λ is the wavelength in metres
T the temperature in kelvins.

The values of the spectral radiant exitance are plotted for different temperatures in Figure 3.1.

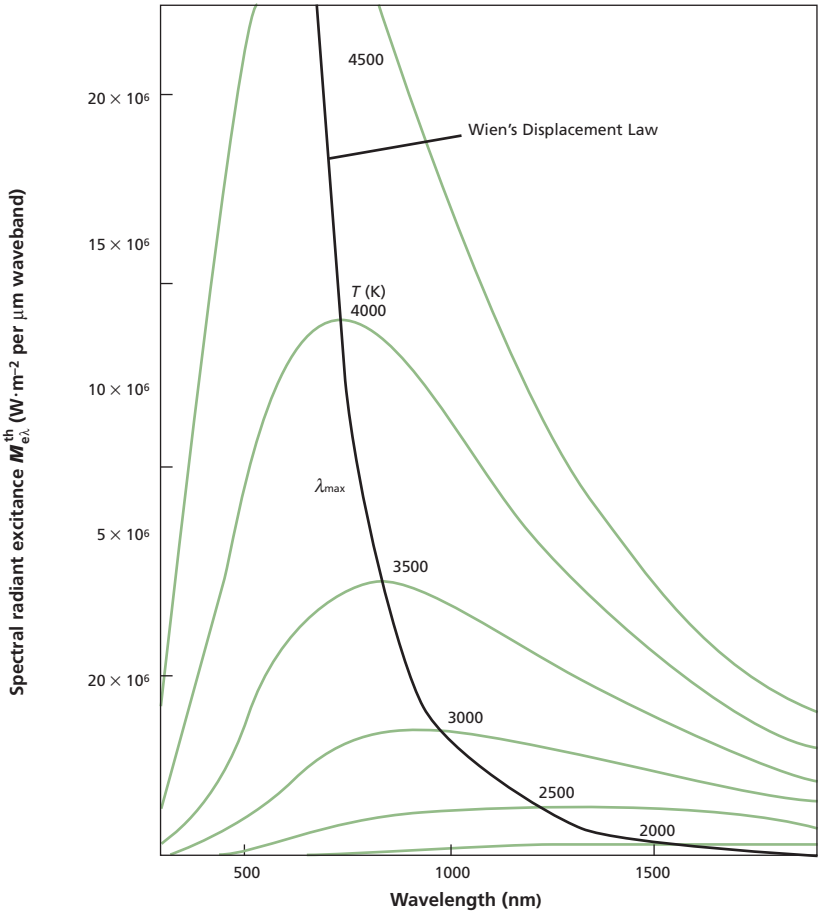

Figure 3.1 Spectral power distribution of radiation according to Planck's Law