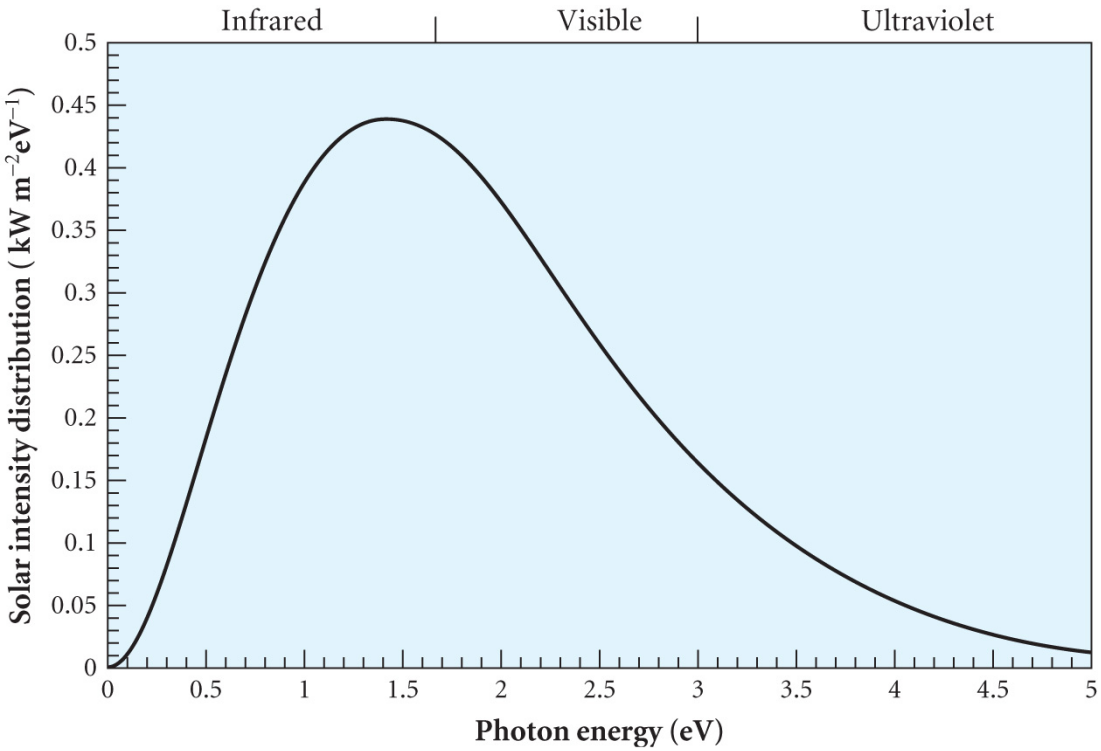
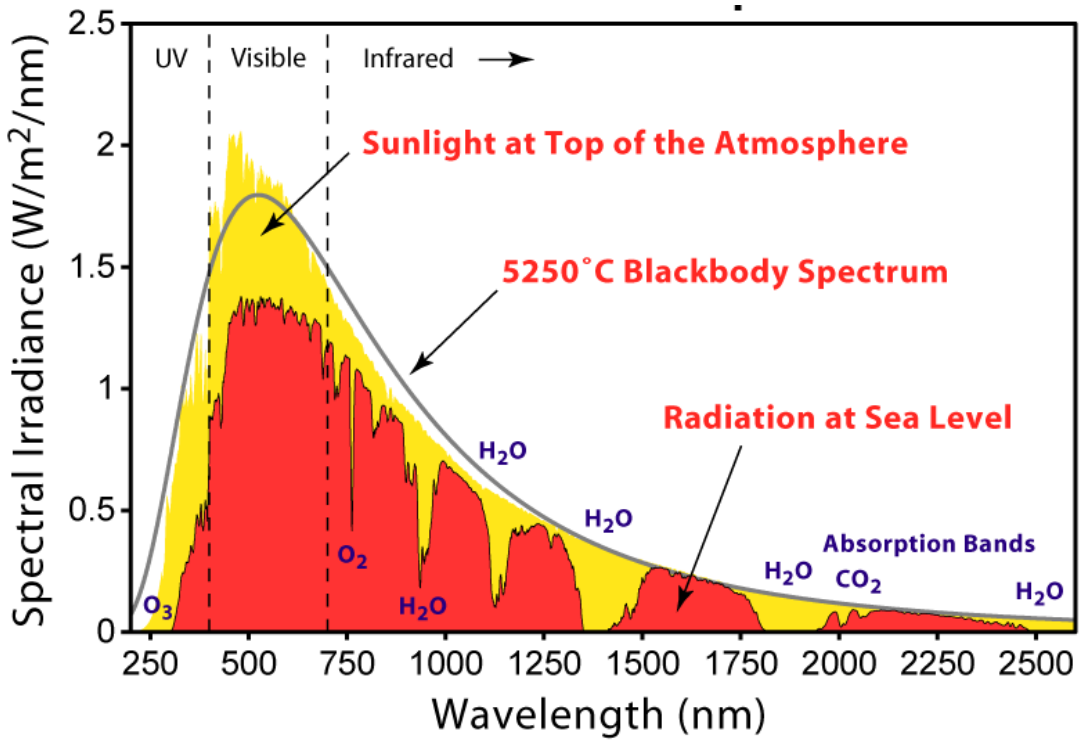
Solar Radiation Spectrum



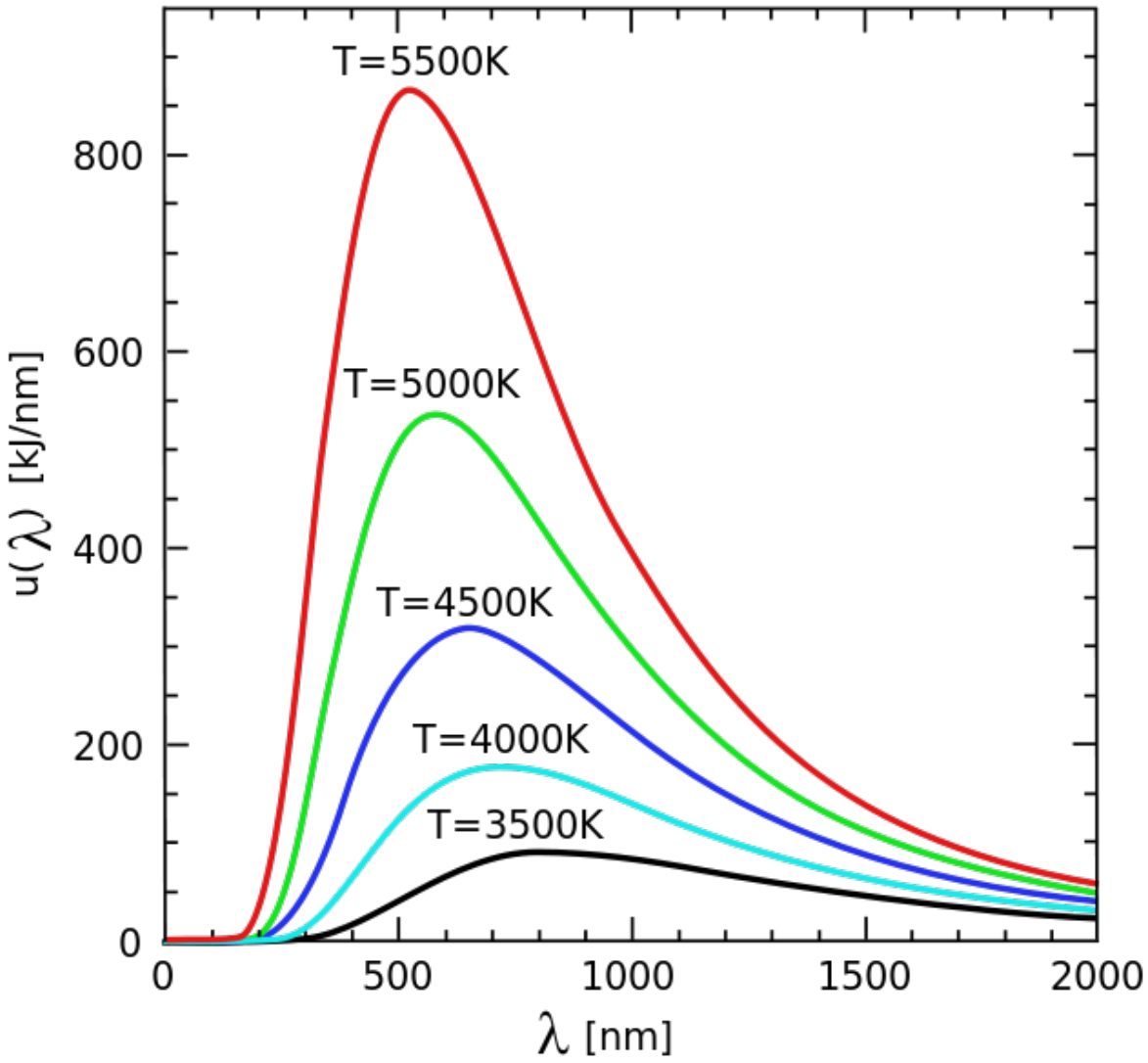
Black body spectrum at T=5800 K (from AJ ch. 6). The total intensity is normalised to that of the AM1.5 solar spectrum of 1 kWm^{-2}



Solar irradiance spectrum incident on the atmosphere and at the surface of the earth (From: American Society for Testing and Materials (ASTM) Terrestrial Reference Spectra).

Wein's Displacement Law

The wavelength distribution of thermal radiation from a black body at any temperature has essentially the same shape as the distribution at any other temperature, except that each wavelength is displaced on the graph.

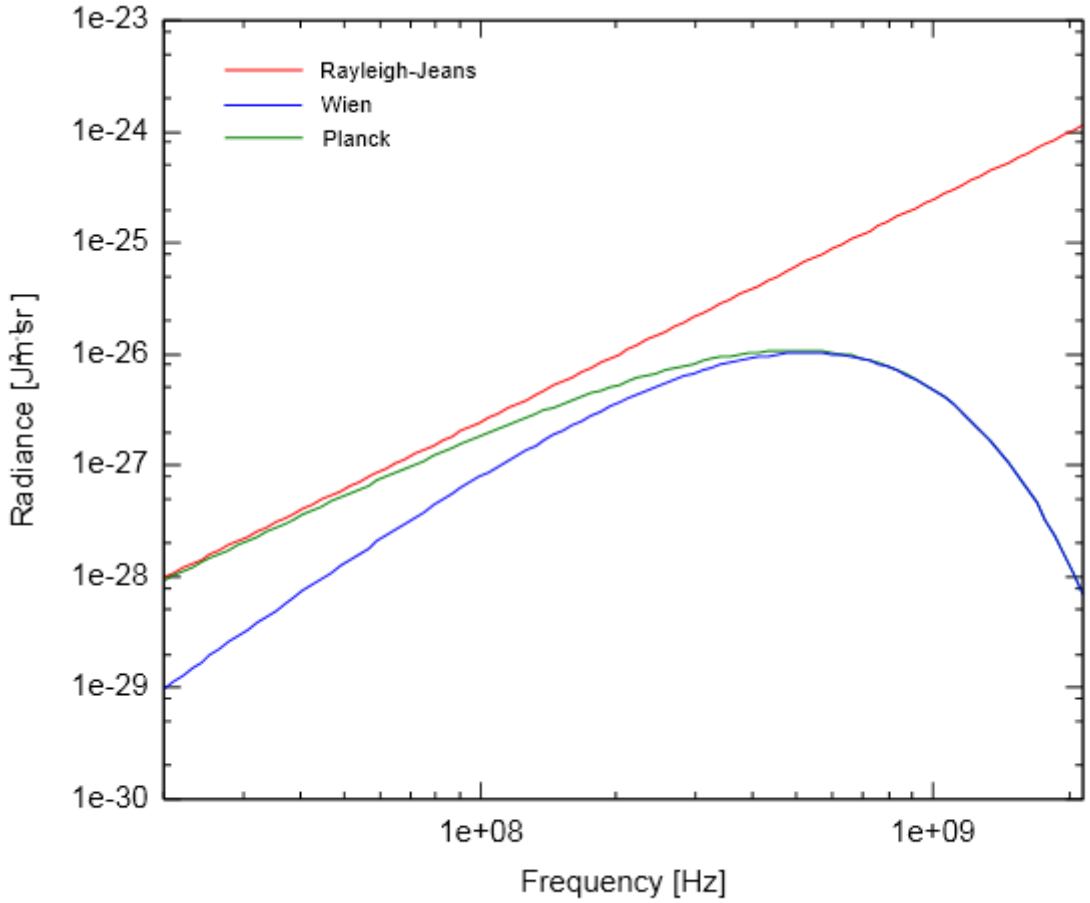


Rayleigh-Jeans Law

Spectral radiance of electromagnetic radiation at all wavelengths from a black body at a given temperature through **classical** arguments:

$$u_\nu = \frac{2\upsilon^2 k_\mathrm{B} T}{c^2}$$

$$u_\lambda = \frac{2ck_\mathrm{B} T}{\lambda^4}$$



Comparison of Rayleigh–Jeans law with Wien approximation and Planck's law, for a body of 8 mK temperature. **Ultraviolate catastrophe** when classical and quantum descriptions diverge. (From Rayleeigh-Jeans law Wiki page)

Exercise: A source of light of wavelength of 560 nm of intensity 800Wm^{-2} is incident on a solar cell. What is the incident flux of photons ?