Updates to some TSBB21 lectures 2023

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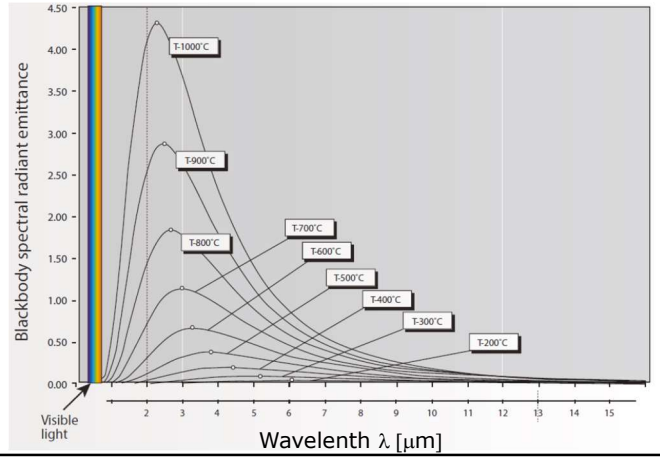
Planck's and Stefan-Boltzmann's laws

Repetition: Planck's law



The relation between Planck's and Stefan-Boltzmann's laws

- According to Planck's law, the spectral emittance of a blackbody is:
$$M(\lambda, T) = \frac{2\pi hc^2}{\lambda^5(e^{hc/\lambda kT} - 1)}$$
- It can be shown that the integral over Planck's law for all wavelengths of a blackbody gives that the total radiated energy is:
$$W = \sigma T^4 \ [W/m^2],$$
where σ is the Stefan-Boltzmann's constant. (It is not so easy to perform the integration!)
- For a greybody, $W = \varepsilon\sigma T^4 \ [W/m^2]$, where ε is the emissivity.