

MATH327: StatMech and Thermo, Spring 2026

Extra practice — 4d sun

What is the colour of the sun in four dimensions?

In more detail: Consider a universe with four spatial dimensions (in addition to the time dimension). Derive the analogue of the Planck spectrum and find the wavelength where this is maximized as a function of temperature. Then insert the surface temperature of the sun, $T \approx 5778$ K, and use the unit conversion factors below to put the wavelength in units of nm:

$$k_B \approx 8.617 \times 10^{-5} \text{ eV}\cdot\text{K}^{-1}$$

$$\hbar \approx 6.582 \times 10^{-16} \text{ eV}\cdot\text{s}$$

$$c \approx 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}$$

As a warm-up, you can check that you're able to get the correct peak wavelength (roughly 500 nm) for our 3d sun, and an infrared wavelength (roughly $10 \mu\text{m}$) for a warm-blooded animal.