Example 1.2 The spectral density of the sun peaks at a wavelength of 900 nm. If the sun behaves as a black body, what is the temperature of the sun?

Solution A wavelength of 900 nm corresponds to a photon energy of:

\[ E_{ph} = \frac{hc}{\lambda} = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{900 \times 10^{-9}} = 2.21 \times 10^{-19} \text{ Joule} \]

Since the peak of the spectral density occurs at 2.82 \( kT \), the corresponding temperature equals:

\[ T = \frac{E_{ph}}{2.82k} = \frac{2.21 \times 10^{-19}}{2.82 \times 1.38 \times 10^{-23}} = 5672 \text{ Kelvin} \]