

### Answer on Question #81515 Physics / Classical Mechanics

Express the Planck radiation formula in terms of wavelength.

#### Solution:

The Planck spectral radiance of blackbodies in frequency form

$$B_\nu(T) = \frac{2h\nu^3}{c^2} \frac{1}{e^{\frac{h\nu}{k_B T}} - 1}$$

The spectral radiance in wavelength form

$$B_\lambda(T) = B_\nu(T) \left| \frac{d\nu}{d\lambda} \right|$$

Since

$$\nu = \frac{c}{\lambda}, \quad d\nu = -\frac{c}{\lambda^2} d\lambda$$

we get

$$\begin{aligned} B_\lambda(T) &= \frac{2h \left(\frac{c}{\lambda}\right)^3}{c^2} \frac{1}{e^{\frac{hc}{\lambda k_B T}} - 1} \left| -\frac{c}{\lambda^2} \right| \\ &= \frac{2hc^2}{\lambda^5} \frac{1}{e^{\frac{hc}{\lambda k_B T}} - 1} \end{aligned}$$

**Answer:**  $B_\lambda(T) = \frac{2hc^2}{\lambda^5} \frac{1}{e^{\frac{hc}{\lambda k_B T}} - 1}$

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