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As $d\lambda$ is the range of wavelength, hence $U_\lambda d\lambda$ should not have any negative value thus we should take its positive value.

In order to compare with experimental black body experimental result, we should calculate emitted radiation intensity (E_λ). The standard relation between E_λ and U_λ is expressed as

$$E_\lambda = \frac{c}{4} U_\lambda$$

Using the expression of U_λ , we get

$$E_\lambda = \frac{2\pi C}{\lambda^4} \bar{\epsilon}$$

The above expression can be used to determine the intensity of radiation i.e. amount of energy radiated per unit area, per unit time in a perpendicular direction to the radiating surface.

Using the above expression Rayleigh and J.H. Jeans made attempt to calculate E_λ . The average energy $\bar{\epsilon}$ of an oscillator was calculated on the basis of the theorem of equipartition of energy. As per the theorem the average energy per degree of freedom of a gas molecule is $\frac{1}{2}kT$ where k is Boltzmann constant and T is the absolute temperature of the system. An electromagnetic standing wave

in an atomic oscillator. Such a linear oscillator has two degrees of freedom corresponding to its kinetic and potential energies. Thus, the mean energy of each oscillator at an absolute temperature

T is given by $\bar{\epsilon} = kT$

Substituting this value we get

$$u_{\lambda} d\lambda = \frac{8\pi}{\lambda^4} kT \text{ and } E_{\lambda} = \frac{2\pi c}{\lambda^4} kT$$

This expression is known as Rayleigh-Jeans radiation law. This expression of E_{λ} agrees with the experimental results in the long wavelength region of the spectrum but it fails completely for shorter wavelengths as $\lambda \rightarrow 0, E \rightarrow \infty$.

But experimental result shows that when $\lambda \rightarrow 0, E_{\lambda}$ value becomes zero. This failure of Rayleigh-Jeans law to account for experimental findings in the shorter wavelengths is known as ultraviolet catastrophe. This discrepancy is actually a failure of the equipartition theorem. This indicates limitations of classical mechanics which is based on equipartition theorem.