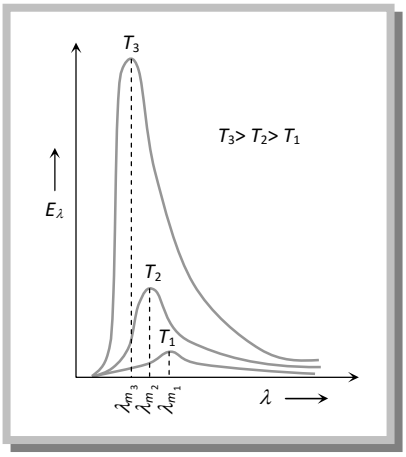
Distribution of Energy in the Spectrum of Black Body.

Langley and later on Lummer and Pringsheim investigated the distribution of energy amongst the different wavelengths in the thermal spectrum of a black body radiation. The results obtained are shown in figure. From these curves it is clear that

(1) At a given temperature energy is not uniformly distributed among different wavelengths.



(2) At a given temperature intensity of heat radiation increases with wavelength, reaches a maximum at a particular wavelength and with further increase in wavelength it decreases.

(3) With increase in temperature wavelength λ_m corresponding to most intense radiation decreases in such a way that $\lambda_m \times T = \text{constant.}$ [Wien's law]

(4) For all wavelengths an increase in temperature causes an increase in intensity.

(5) The area under the curve $= \int E_\lambda d\lambda$ will represent the total intensity of radiation at a particular temperature. This area increases with rise in temperature of the body. It is found to be directly proportional to the fourth power of absolute temperature of the body, i.e.

$E = \int E_\lambda d\lambda \propto T^4$ [Stefan's law]

(6) The energy (Emax) emitted corresponding to the wavelength of maximum emission (λm) increases with fifth power of the absolute temperature of the black body i.e. $E_{\max} \propto T^5$