Radiazione di corpo nero (blackbody radiation)

Corpo nero: "oggetto" che assorbe tutta la radiazione incidente, indipendentemente dalla sua lunghezza d'onda: $a = \frac{energia\ assorbita}{energia\ incidente} = 1$

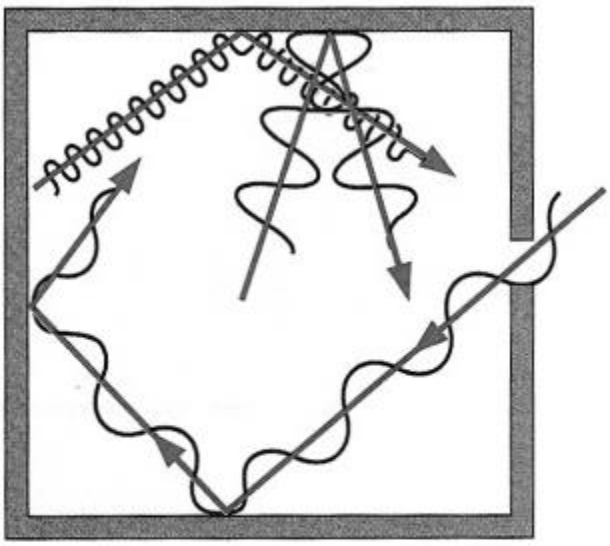
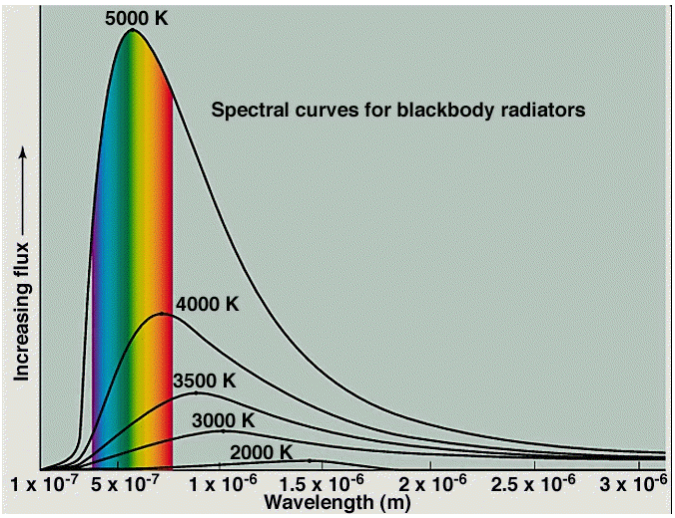


FIGURE 3.15 A cavity filled with electromagnetic radiation. The hole in the wall of the cavity represents an ideal blackbody.

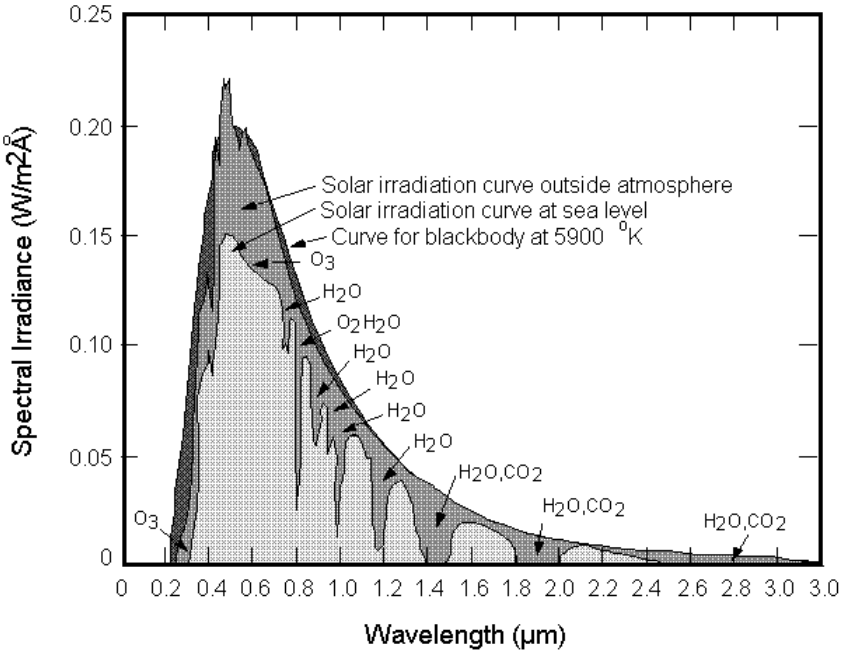
Legge di Wien: $\lambda_{max} \sim \frac{1}{T}$

Legge di Stefan: $I\left(\frac{W}{m^2}\right) = \sigma\, e\, T^4$, con e= emissività = a.

Per corpo nero, essendo a=1, si ha e =1, $I = \sigma T^4$, legge universale, indipendente dalle caratteristiche del corpo.



Esempio di corpo nero: il sole



Legge di Wien : la densità di energia u di un corpo nero a temperatura T ($u(\lambda)_T$) dipende da una funzione di λT : $u(\lambda)_T = \frac{f(\lambda T)}{\lambda^5}$

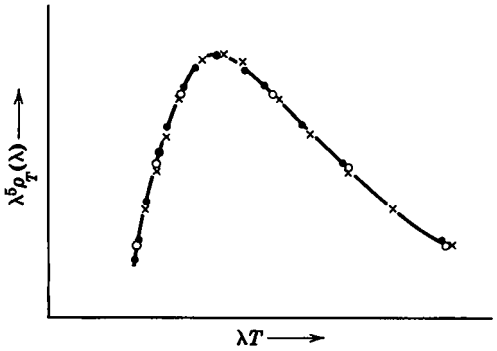
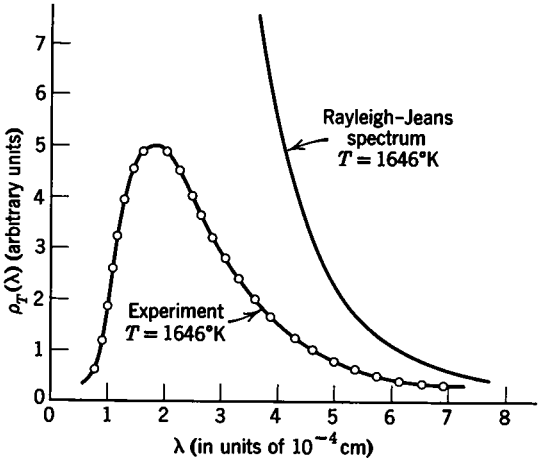


Figure 2–5. An experimental verification of Wien's law. ●, $T = 1646°K$; ×, $T = 1449°K$; ○, $T = 1259°K$. From F. K. Richtmyer, E. H. Kennard, and T. Lauritsen, *Introduction to Modern Physics*, 5th ed., McGraw-Hill Book Co., New York, 1955.

Equazione di Rayleigh-Jeans (classica): $u\ (\lambda)_T = \frac{8\pi\ KT}{\lambda^4}$



re 2–11. A comparison of the Rayleigh-Jeans spectrum and experiment.

Equazione di Planck ("quantistica"): $u(\lambda)_T = \frac{8\pi hc}{\lambda^5} \frac{1}{e^{\frac{hc}{k\lambda T}}-1}$

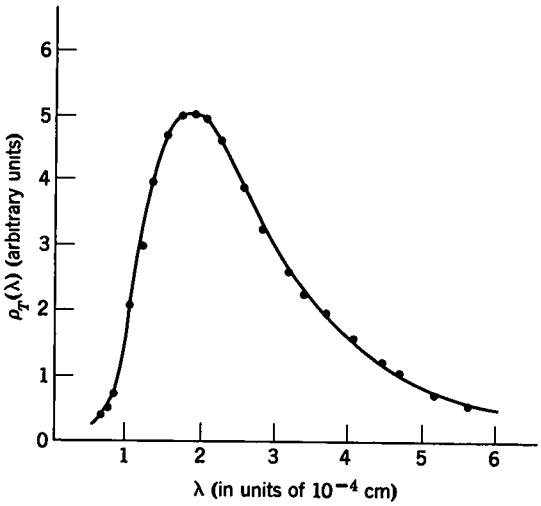
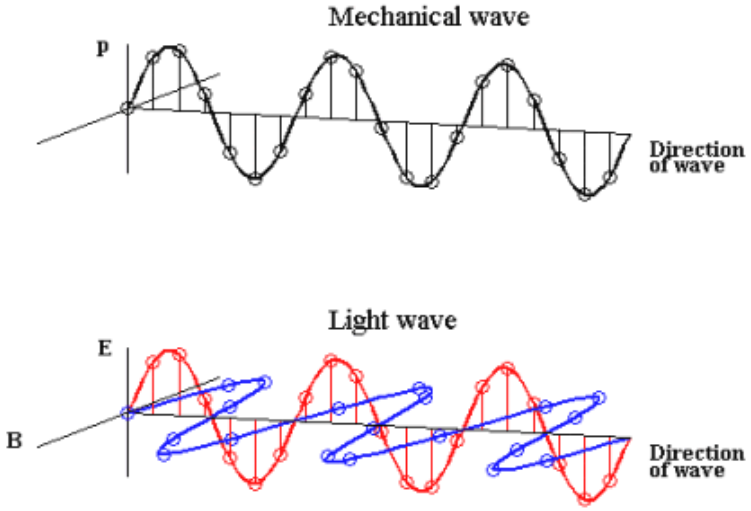


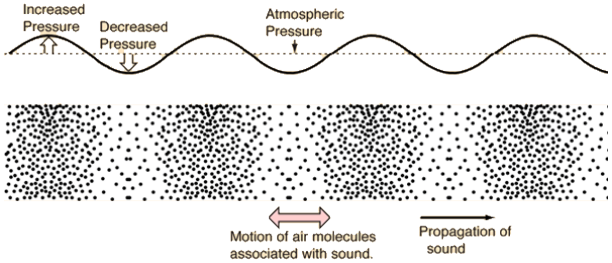
Figure 2–13. A comparison of Planck's spectrum and experiment. The dots are experimental and the curve is theoretical. $T = 1646°K$.

Onde elettromagnetiche

Onde longitudinali (es. meccaniche) e onde trasversali (es. onde elettromagnetiche)



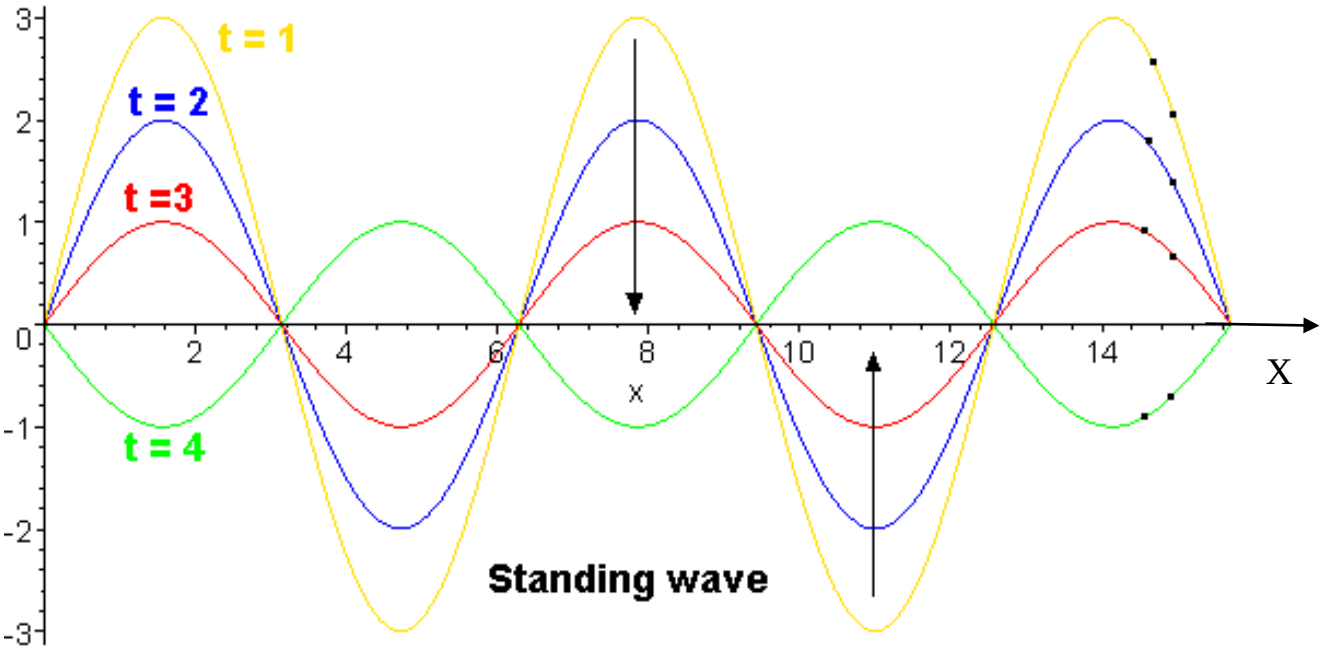
P= pressione



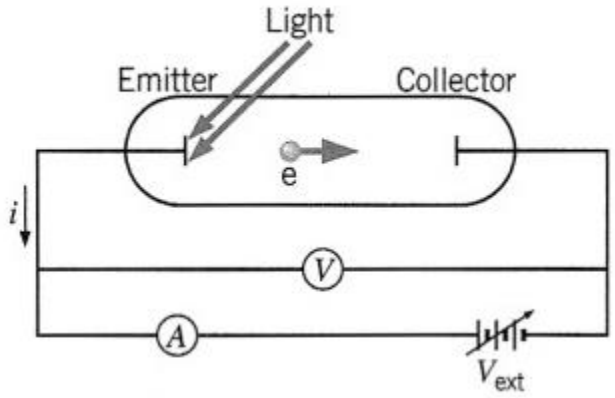
isvr

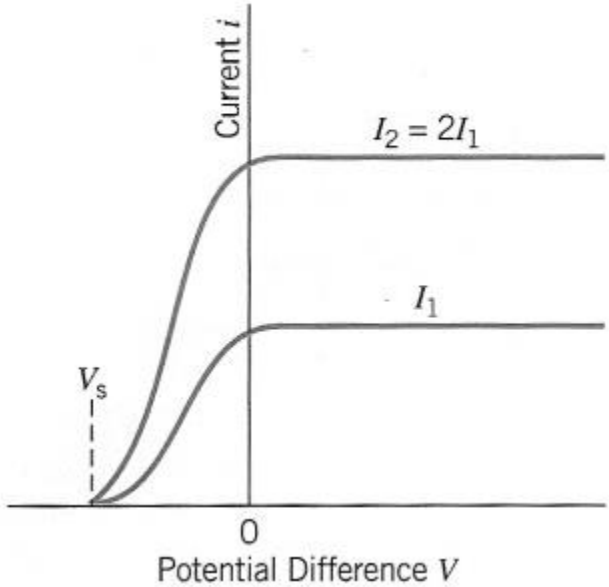
Onde stazionarie (standing waves)

$$E = E_0 sen(kx - \omega t) + E_0 sen(kx + \omega t)$$
$$= 2E_0 sen(kx)\cos(\omega t)$$



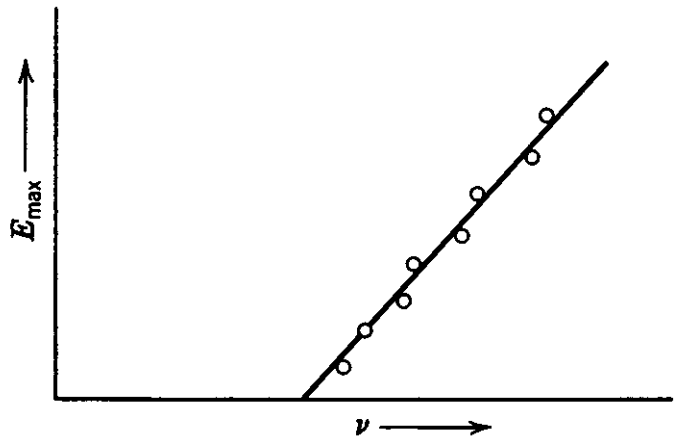
Effetto fotoelettrico





$$E(fotone) = h\upsilon$$

$E_K(\text{max}) = h\nu - W$, frequenza di soglia (nessuna emissione per $\nu < \upsilon_0$) $\upsilon_0 = \frac{W}{h}$,
con W= funzione lavoro o di estrazione (work function)


E_{max}
ν