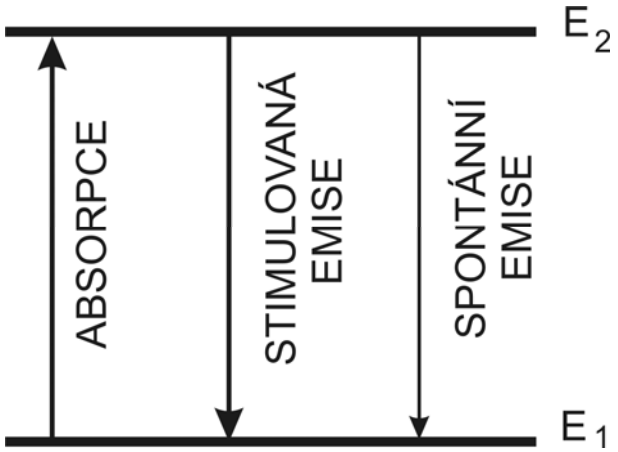
2. Einsteinův termodynamický přístup



$$\frac{dN_2}{dt} = -A N_2$$

$$\frac{dN_2}{dt} = -B_{21}\,\rho(\nu)\,N_2$$

$$\frac{dN_1}{dt} = -B_{12}\,\rho(\nu)\,N_1$$

Princip detailní rovnováhy

$$B_{12}\,\rho(\nu)\;N_1 = A\,N_2 + B_{21}\,\rho(\nu)\;N_2$$

Termodynamická rovnováha s teplotou T

$$\frac{N_2}{N_1} = \frac{g_2}{g_1}\exp\left[-\frac{h\nu}{k_B T}\right]$$

$$\rho(\nu,T)\,d\nu = \frac{8\pi\nu^2\,d\nu}{c_0{}^3}\,\frac{1}{e^{\frac{h\nu}{k_B T}}-1}\,h\nu$$

$$B_{12}\,\rho(\nu)\;N_1 = A\,N_2 + B_{21}\,\rho(\nu)\;N_2$$

$$B_{12} = A\frac{N_2}{\rho(\nu)N_1} + B_{21}\frac{N_2}{N_1}$$

$$T \to \infty \;\; : \qquad \frac{N_2}{N_1} \to \frac{g_2}{g_1} \qquad \rho \to \infty \qquad \Rightarrow \;\; g_1\,B_{12} = g_2\,B_{21}$$

$$\frac{g_2}{g_1}B_{21} = A\frac{g_2}{g_1}\exp\left(-\frac{h\nu}{k_B T}\right)\frac{c^3\left[\exp\left(\frac{h\nu}{k_B T}\right)-1\right]}{8\pi h\nu^3}$$

$$+ B_{21}\frac{g_2}{g_1}\exp\left(-\frac{h\nu}{k_B T}\right)$$

$$B_{21}\left[1-\exp\left(-\frac{h\nu}{k_B T}\right)\right]=A\frac{c^3\left[1-\exp\left(-\frac{h\nu}{k_B T}\right)\right]}{8\pi h\nu^3}$$

$$B_{21}=A\frac{c^3}{8\pi h\nu^3}$$

A, B vztaženy na v !!!