Emission equilibrium

Let A be spontaneous emission rate and let $B\rho(\nu)$ be stimulated emission rate.

Find frequency ν such that

$$A = B\rho(\nu)$$

Substitute for $\rho(\nu)$.

$$A = B\,\frac{A/B}{\exp\left(\frac{h\nu}{kT}\right) - 1}$$

Hence

$$\exp\left(\frac{h\nu}{kT}\right) = 2$$

Take the log of both sides.

$$\frac{h\nu}{kT} = \log 2$$

Hence

$$\nu = \frac{kT}{h}\log 2$$

For $T = 300\,\mathrm{K}$ we have

$$\nu = 4.33 \times 10^{12}\,\mathrm{Hz}$$

Eigenmath script