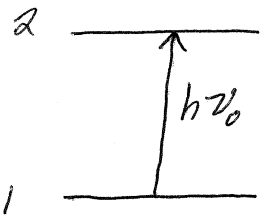
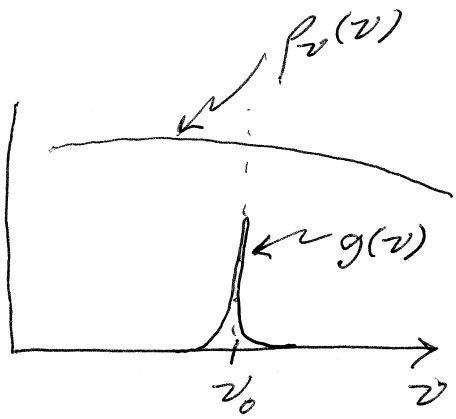
Transition Rates for Monochromatic Radiation

Einstein's derivation:

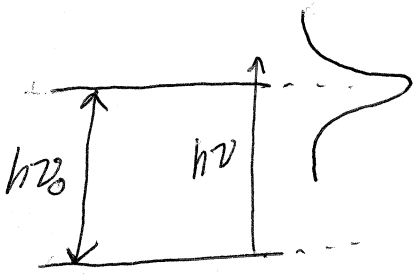


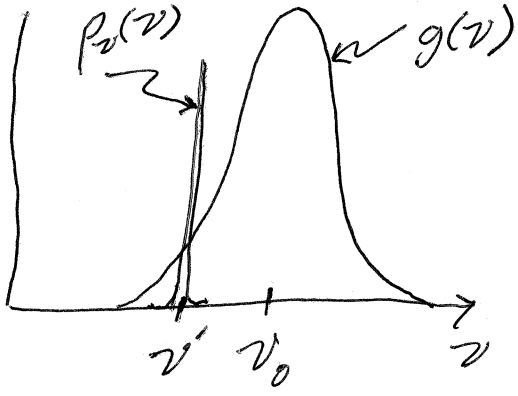
$$W_{12}^{ind} = B_{12}\,\rho_\nu(\nu_0)$$



Must generalize

$$W_{12} = \int B_{12}\,\rho_\nu(\nu)\,g(\nu)\,d\nu$$





For $\rho_\nu(\nu)$ much narrower than $g(\nu)$,

$$W_{12} \simeq B_{12}\,g(\nu') \int \rho_\nu(\nu)\,d\nu$$

$$\boxed{W_{12} \simeq B_{12}\,g(\nu')\,\rho} \qquad \rho \equiv \int \rho_\nu(\nu)\,d\nu$$

Now $\rho = \dfrac{\text{total energy}}{\text{Vol}}$

before $\rho_\nu = \dfrac{\text{energy}}{\Delta\nu \cdot \text{Vol}}$