

$$\Delta E = E_2 - E_1 = h\nu$$

$$\hbar = \frac{h}{2\pi}$$

$$\nu = \frac{c}{\lambda} = c\tilde{\nu}$$

$$\tilde{\nu} = \frac{1}{\lambda}$$

$$E_\nu = \left(\nu + \frac{1}{2}\right) h\nu_0 = \left(\nu + \frac{1}{2}\right) hc\tilde{\nu}_0$$

$$\tilde{\nu}_0 = \frac{1}{2\pi c} \sqrt{\frac{k}{\mu}}$$

$$\mu = \frac{m_1 m_2}{m_1 + m_2}$$

$$E_J = hB[J(J+1)] = hc\tilde{B}[J(J+1)]$$

$$\tilde{B} = \frac{h}{8\pi^2 cI}$$

$$I = \mu r^2$$

$$\tilde{B}_\nu = \tilde{B}_e - \tilde{\alpha}_e \left(\nu + \frac{1}{2}\right)$$

$$F(J) = \tilde{B}_\nu[J(J+1)] - \tilde{D}J^2(J+1)^2$$

$$\tilde{\nu} = G(\nu) - G(0) = \nu\tilde{\nu}_e - \tilde{x}_e\tilde{\nu}_e\nu(\nu+1)$$

$$G(\nu) = \left(\nu + \frac{1}{2}\right)\tilde{\nu}_e - \left(\nu + \frac{1}{2}\right)^2\tilde{x}_e\tilde{\nu}_e$$

$$\tilde{D}_0 = \tilde{D}_e - \frac{\tilde{\nu}_e}{2} + \frac{\tilde{\nu}_e\tilde{x}_e}{4}$$

$$\hat{H}\psi = E\psi$$

$$P_{12} \propto | \langle \mu_{12} \rangle |^2 \delta(E_2 - E_1 - h\nu)$$

$$\langle \mu_{12} \rangle = \int_\tau \psi_2^* \hat{H}_1 \psi_1 d\tau$$

$$\hat{H}_{NZ} = \frac{-g_N \beta_N B_0 (1-\sigma)}{\hbar} \hat{I}_z$$

$$\hat{I}_x \alpha = \frac{\hbar}{2} \beta$$

$$\hat{I}_y \alpha = \frac{i\hbar}{2} \beta$$

$$\hat{I}_z \alpha = \frac{\hbar}{2} \alpha$$

$$\hat{I}_x \beta = \frac{\hbar}{2} \alpha$$

$$\hat{I}_y \beta = \frac{-i\hbar}{2} \alpha$$

$$\hat{I}_z \beta = \frac{-\hbar}{2} \beta$$

$$\Delta E = h\nu = g_N \beta_N B_0 (1-\sigma)$$

$$\hat{H}_1 = \frac{-g_N \beta_N B_1}{\hbar} \hat{I}_x$$

$$\delta_1 - \delta_2 = \frac{\nu_1 - \nu_2}{\nu_{spec}} * 10^6 \text{ppm}$$