

ABSORÇÃO

$$\sigma(\omega_f) = -\frac{8e\omega_f}{\varepsilon_0 c} \int_0^{T_0} dt \operatorname{Im} \{ \langle \Psi_0; t | z | 1; t \rangle \langle \Psi_0; t | 1; t \rangle \} \cos(\omega_f t) -$$
$$\frac{8e\omega_f}{\varepsilon_0 c} \int_0^{T_0} dt \operatorname{Im} \{ \langle \Psi_0; t | z | 2; t \rangle \langle \Psi_0; t | 2; t \rangle \} \cos(\omega_f t)$$

$$\langle \Psi_0; t | 1; t \rangle = \int_{-\infty}^{+\infty} dz \Psi_0^*(z, t) \psi_1(z) e^{-iE_1 t/\hbar}$$

$$\langle \Psi_0; t | z | 1; t \rangle = \int_{-\infty}^{+\infty} dz \Psi_0^*(z, t) z \psi_1(z) e^{-iE_1 t/\hbar}$$

$$\langle \Psi_0; t | 2; t \rangle = \int_{-\infty}^{+\infty} dz \Psi_0^*(z, t) \psi_2(z) e^{-iE_1 t/\hbar}$$

$$\langle \Psi_0; t | z | 2; t \rangle = \int_{-\infty}^{+\infty} dz \Psi_0^*(z, t) z \psi_2(z) e^{-iE_1 t/\hbar}$$