Clase 6

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$$H\psi_n = E_n\psi_n$$
$$(H_0+\lambda w)\sum_{k=0}^{\infty}\lambda^k\psi_n^{(k)} = \sum_{l=0}^{\infty}\lambda^l E_n^{(l)}\sum_{r=0}^{\infty}\lambda^r\psi_n^{(r)}$$
$$\lambda = 0, l = 0 \qquad E_n \qquad\qquad \lambda = 0, r = 0 \qquad \phi_n$$
$$= \sum_{k=0}^{\infty}\lambda^k\sum_{l=0}^{k}E_n^{(l)}\psi_n^{r-l}$$

a primer orden k = 1 $E_n = E_n^{(0)} + \lambda E_n^{(1)} + \cdots$ $\qquad \psi_n = \phi_n + \lambda\psi_n^{(1)} + \cdots$

$$\lambda\{H_0\psi_n^{(1)} + w\phi_n\} = \lambda\{E_n^{(0)}\psi_n^{(1)} + E_n^{(1)}\phi_n\}$$
$$H_0\left|\psi_n^{(1)}\right\rangle + w\left|\phi_n\right\rangle = E_n^{(0)}\left|\psi_n^{(1)}\right\rangle + E_n^{(1)}\left|\phi_n\right\rangle$$
$$E_n^{(1)} = \langle\phi_n| w |\phi_n\rangle$$
$$\lambda E_n^{(1)} = \langle\phi_n| \lambda w |\phi_n\rangle = \langle\phi_n| H_p |\phi_n\rangle$$

A segundo orden

$$E_n^{(2)} = \langle\phi_n| w \left|\psi_n^{(1)}\right\rangle = \sum_{m\neq n}\langle\phi_n| w |\phi_m\rangle\frac{\langle\phi_m| w |\phi_n\rangle}{E_n^{(0)} - E_m^{(0)}} = \sum_{m\neq n}\frac{\left|\langle\phi_n| w |\phi_m\rangle\right|^2}{E_n^{(0) - E_m^{(0)}}}$$
$$\lambda^2\left|\psi_n^{(2)}\right\rangle = \sum_{m\neq n, l\neq n}|\phi_m\rangle\frac{\langle\phi_m| H_p |\phi_l\rangle\langle\phi_l| H_p |\phi_n\rangle}{(E_n^{(0)} - E_n^{(0)})(E_n^{(0) - E_l^{(0)}})} - \sum_{m\neq n}|\phi_m\rangle\frac{\langle\phi_n| H_p |\phi_m\rangle\langle\phi_m| H_p |\phi_m\rangle}{(E_n^{(0)} - E_m^{(0)})^2}$$