

$$\delta E = \langle -\nabla U | - \rangle$$

$$\delta E = \frac{U}{L} \int_0^L \sin^2 \frac{m\pi}{a} x \sum_n U_n \cos \frac{2n\pi}{a} x dx$$

~~$$\delta E =$$~~

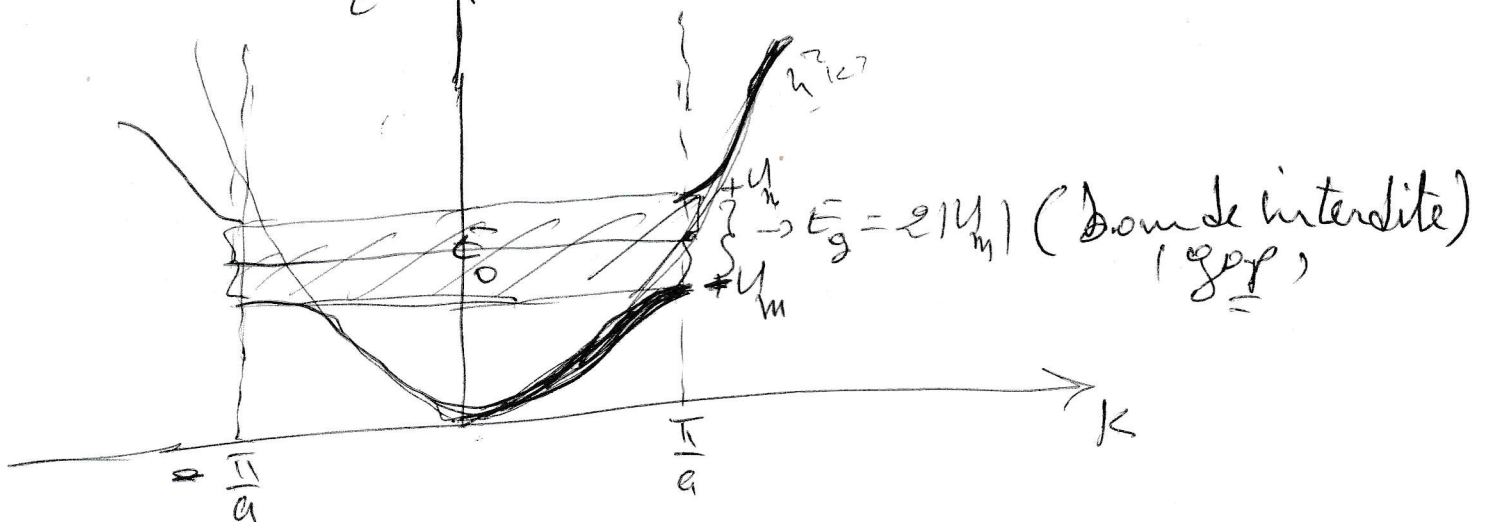
$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$\cos 2\alpha = 1 - 2\sin^2 \alpha$$

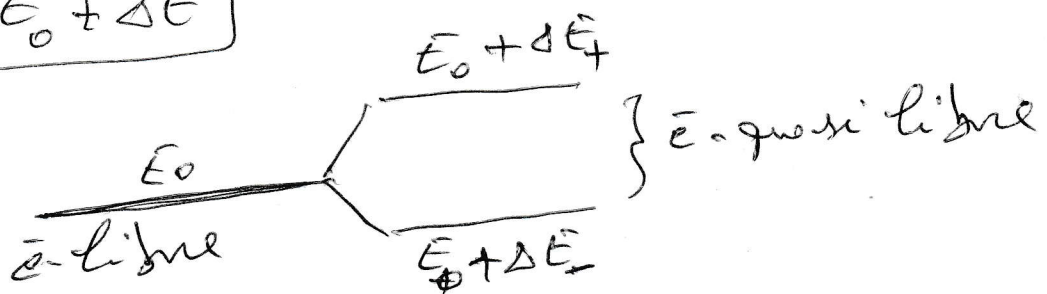
$$\sin^2 \alpha = \frac{1}{2}(1 - \cos 2\alpha)$$

$$\boxed{\delta E = -U_m}$$

d'où $\Delta E = \Delta E_+ + \Delta E_- = U_m + U_m = 2U_m$

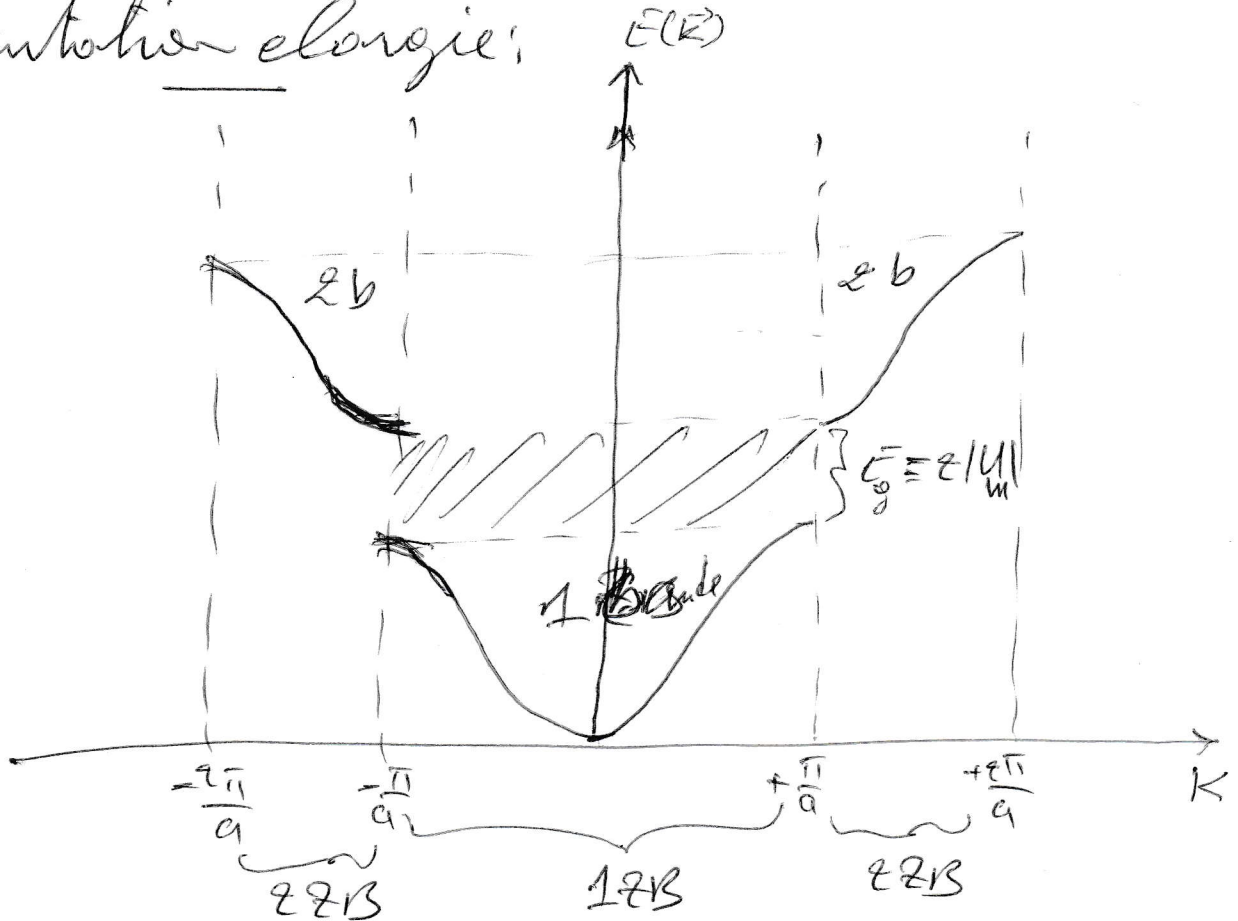


$$\boxed{E = E_0 + \Delta E}$$



*) Représentation des bandes d'énergies:

1) présentation élargie:



2) présentation réduite:

