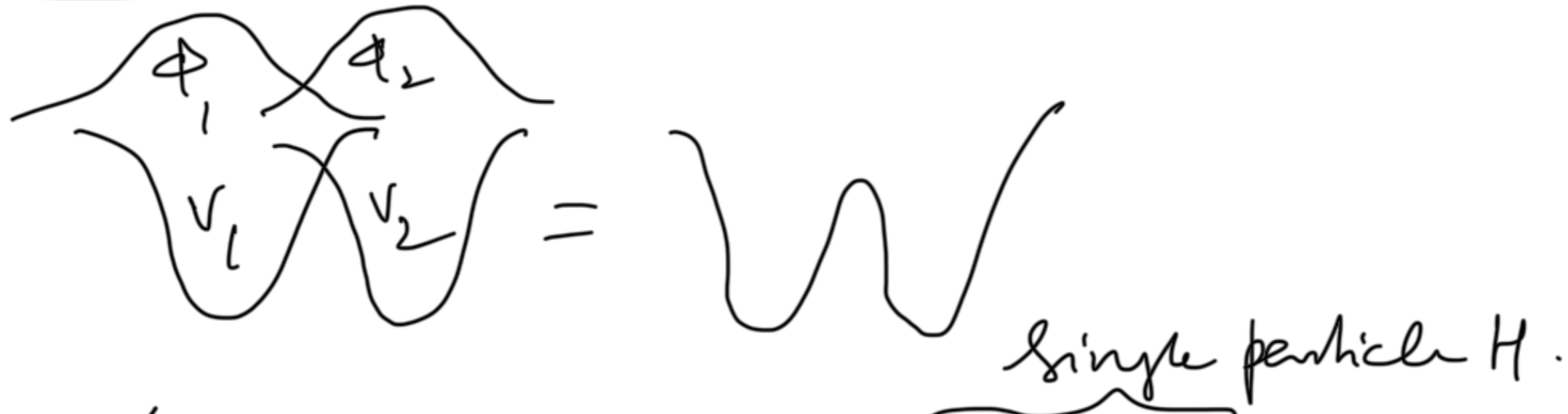


# On TB parameters



$$t = \langle \phi_1 | H | \phi_2 \rangle = \langle \phi_1 | (T + V_1 + V_2) | \phi_2 \rangle$$

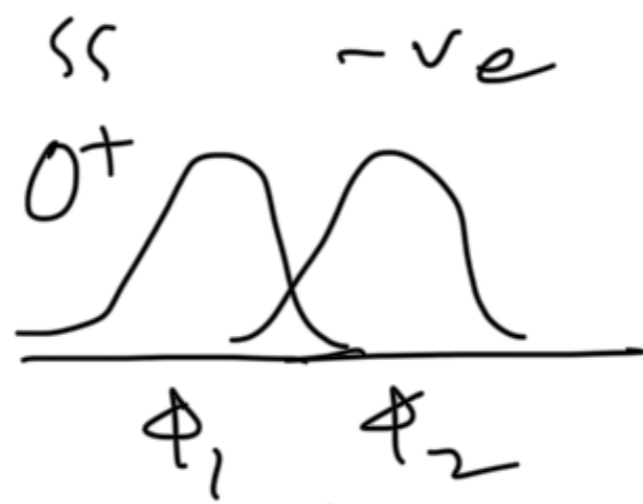
$$= \langle \phi_1 | \left( \frac{T + V_1}{2} + \frac{V_1}{2} + \frac{T + V_2}{2} + \frac{V_2}{2} \right) | \phi_2 \rangle$$

$$= \langle \phi_1 | \left( \frac{H_1}{2} + \frac{V_1}{2} + \frac{H_2}{2} + \frac{V_2}{2} \right) | \phi_2 \rangle$$

$$= E_1 \frac{\langle \phi_1 | \phi_2 \rangle}{2} + \frac{\langle \phi_1 | V_1 | \phi_2 \rangle}{2} + E_2 \frac{\langle \phi_1 | \phi_2 \rangle}{2} + \frac{\langle \phi_1 | V_2 | \phi_2 \rangle}{2}$$

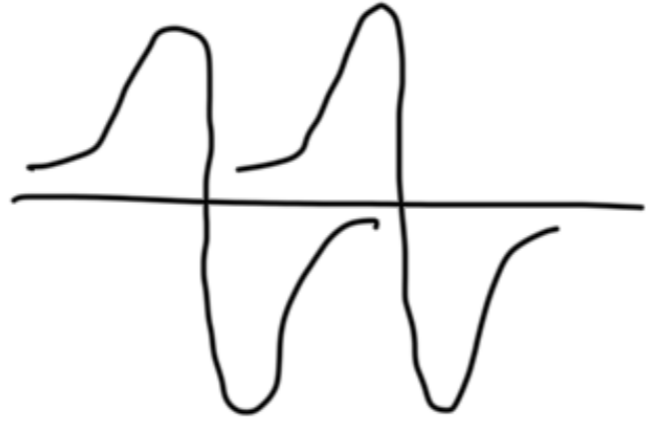
$$= \underbrace{\frac{\langle \phi_1 | \phi_2 \rangle}{2}}_{\sim} (E_1 + E_2) + \underbrace{\langle \phi_1 | \left( \frac{V_1 + V_2}{2} \right) | \phi_2 \rangle}_{-V_c}$$

Note that if



$$\Rightarrow z < 0$$

if



$$\Rightarrow t > 0$$