$$H = T + v = \underbrace{T + U + V_p}_{\text{mean field}} + (v - U - V_p)$$

diagonalization

Kramers degeneracy $\nu\bar{\nu}$

$$\alpha_\nu^\dagger = U_\nu a_\nu^\dagger - V_\nu a_{\bar{\nu}};$$

ground state

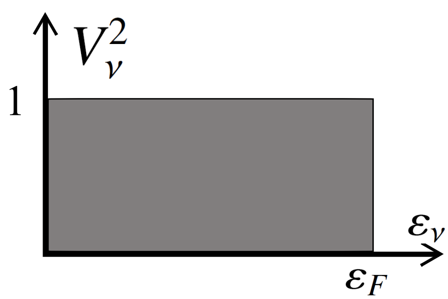
$$\alpha_\nu |\tilde{0}\rangle = 0$$

$$|\tilde{0}\rangle = \prod_{\nu>0} \alpha_\nu \alpha_{\bar{\nu}} |0\rangle \sim \prod_{\nu>0} \left(U_\nu + V_\nu a_\nu^\dagger a_{\bar{\nu}}^\dagger \right) |0\rangle$$

$$a_\nu |0\rangle = 0$$

<u>Ansatz 1</u>: $|\tilde{0}\rangle$ sharp step–funct. occ.

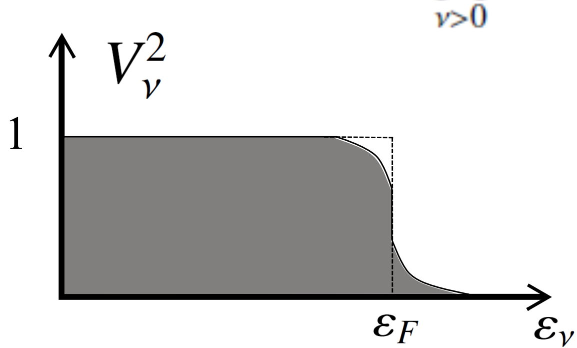
$$|HF\rangle = \prod_{i>0} a_i^\dagger a_{\bar{i}}^\dagger |0\rangle = \prod_i a_i^\dagger |0\rangle$$



independent particle motion (**fermions**)

<u>Ansatz 2</u>: $|\tilde{0}\rangle$ sigmoidal distr. occ.

$$|BCS\rangle = \prod_{\nu>0} \left(U_\nu + V_\nu a_\nu^\dagger a_{\bar{\nu}}^\dagger \right) |0\rangle$$



independent pair motion (**bosons**)