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

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

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

ground state

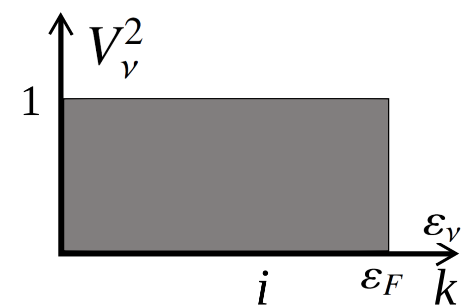
$$\alpha_\nu|\tilde{0}\rangle = 0$$

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

$$a_\nu|0\rangle$$

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

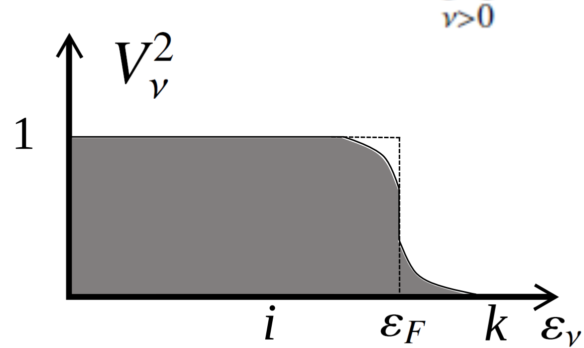
$$|HF\rangle = \prod_{i>0} a_i^\dagger a_{\bar{i}}^\dagger|0\rangle = \prod_i a_i^\dagger|0\rangle$$




independent particle motion (**fermions**)

Ansatz 2: $|\tilde{0}\rangle$ 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**)