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

$$\alpha_{v}^{\dagger}=U_{v}a_{v}^{\dagger}-V_{v}a_{\bar{v}};$$
 ground state

 $H = T + v = T + U + V_p + (v - U - V_p)$

mean field

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

ground state

Ansatz 1:
$$|\tilde{0}\rangle$$
 s

Ansatz 1:
$$|\tilde{0}\rangle$$
 sharp step-funct. occ. $|HF\rangle = \int$

$$\uparrow V$$

$$1 \bigvee_{1} V$$

$$i$$
 ε_F Ansatz 2: $|\tilde{0}\rangle$ sigmoidal distr. occ.



i

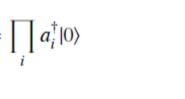
$$|HF\rangle =$$

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

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

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

$$\rangle = \prod_{i}$$



$$\prod_i a_i^{\dagger} |0\rangle$$

$$-\prod_{i} a_{i}$$
 independent particle

independent pair

motion ((quasi) bosons)

$$\left| \prod_{i} a_{i}^{!} | 0 \right\rangle$$

$$\left[\, a_i^\dagger | 0
ight
angle$$

motion (fermions)