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

Kramers degeneracy  $v\bar{v}$ diagonalization  $\alpha_{\nu}^{\dagger} = U_{\nu} a_{\nu}^{\dagger} - V_{\nu} a_{\bar{\nu}};$ 

ground state

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

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

$$a_{\nu}|0\rangle = 0$$
A party 1:  $|\tilde{0}\rangle$  sharp step, funct, each

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

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

$$1 \qquad \qquad \text{independent motion (few)}$$

independent particle motion (fermions)

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

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

$$1 \qquad \qquad \text{independent motion (the second sec$$

independent pair motion (bosons)