

$$2\Delta \approx \delta E \approx \delta \left( \frac{p^2}{2m} \right)_{\epsilon_F} \approx v_F \delta p.$$

$$\frac{\delta p}{p_F} = \frac{2\Delta}{mv_F^2} = \frac{\Delta}{\epsilon_F} \ll 1.$$

$$\xi = \delta x = \frac{\hbar}{\delta p} = \frac{\hbar v_F}{2\Delta}$$

$$g(k) \sim \delta(\mathbf{k}, \mathbf{k}_F + i\hat{\mathbf{k}}_F/\xi),$$

$$\phi_0(\mathbf{r}) \sim e^{-r/\xi} e^{ik_F r}.$$

$$\phi_0(\mathbf{r}) \sim e^{-r/\xi} \cos k_F r,$$

$$\phi_0(\mathbf{r}) \sim K_0(r/\pi\xi) \cos k_F r,$$