(a) (b) (c) (d) (e) (f) (g)

$$\alpha_\nu |HF\rangle = 0; \quad \alpha_\nu = \begin{cases} a_k & (\epsilon_k > \epsilon_F) \\ b_i = (-1)^{phase} a_{\tilde{i}}^\dagger & (\epsilon_i \leq \epsilon_F) \end{cases}$$