

$$\epsilon_d (\mathbf{n}_{1\uparrow} - \mathbf{n}_{1\downarrow})^2$$

$$j \mathbf{S}_1 \cdot \mathbf{S}_2$$

$$v \sum_{\sigma} \left( \mathbf{c}_{1\sigma}^{\dagger} \mathbf{c}_{2\sigma} + \text{h.c.} \right)$$

$$\epsilon_F$$