

$$\uparrow \downarrow = |\uparrow, \downarrow\rangle = \hat{c}_{1,\uparrow}^\dagger \hat{c}_{2,\downarrow}^\dagger |0\rangle$$

$$\downarrow \uparrow = |\downarrow, \uparrow\rangle = \hat{c}_{1,\downarrow}^\dagger \hat{c}_{2,\uparrow}^\dagger |0\rangle$$

$$\uparrow \uparrow = |\uparrow, \uparrow\rangle = \hat{c}_{1,\uparrow}^\dagger \hat{c}_{2,\uparrow}^\dagger |0\rangle$$

$$\downarrow \downarrow = |\downarrow, \downarrow\rangle = \hat{c}_{1,\downarrow}^\dagger \hat{c}_{2,\downarrow}^\dagger |0\rangle$$

$$\uparrow \downarrow \circ = |\uparrow \downarrow, \cdot\rangle = \hat{c}_{1,\uparrow}^\dagger \hat{c}_{1,\downarrow}^\dagger |0\rangle$$

$$\circ \uparrow \downarrow = |\cdot, \uparrow \downarrow\rangle = \hat{c}_{2,\uparrow}^\dagger \hat{c}_{2,\downarrow}^\dagger |0\rangle$$