$$H_{bilayer} = 2t_0 \left(\cos k_x + \cos k_y \right) \sigma_0 \tau_0 \nu_0$$

$$+ 4t' \cos \frac{k_x}{2} \cos \frac{k_y}{2} \sigma_0 \tau_x \nu_0$$

$$+ 4t_{id} \cos \frac{k_x}{2} \cos \frac{k_y}{2} \sigma_z \tau_y \nu_0$$

d_{yz}
d_{zx}
d_{xy}

$$\left| J_z = \frac{1}{2} \right\rangle = \frac{1}{\sqrt{3}} \left(\left| d_{yz} \downarrow \right\rangle + i \left| d_{zx} \downarrow \right\rangle + \left| d_{xy} \uparrow \right\rangle \right)$$

$$\left| J_z = -\frac{1}{2} \right\rangle = \frac{1}{\sqrt{3}} \left(\left| d_{yz} \uparrow \right\rangle - i \left| d_{zx} \uparrow \right\rangle - \left| d_{xy} \downarrow \right\rangle \right)$$

$$C^\dagger_{i,A,\uparrow,d_{yz}} C_{i+1,A,\uparrow,yz}$$

$$\left(V_{dd\pi} \cos(\theta)\cos\theta - V_{dd\delta} \sin^2\theta \right) \cdot C^\dagger_{i,A,\uparrow,d_{yz}} C_{i',A,\uparrow,yz}$$

$$\left(V_{dd\pi} \cos(\theta-\pi)\cos(\theta+\pi) \right. $$
$$\left. - V_{dd\delta} \sin(\theta-\pi)\sin(\theta+\pi) \right) C^\dagger_{i,A,\uparrow,yz} C_{i-1,A,\uparrow,yz}$$

$$\left(V_{dd\pi} \cos^2\theta - V_{dd\delta} \sin^2\theta \right)$$