

$$2) \quad |\psi_\ell\rangle = \frac{1}{2} \sum_{\vec{c}_1}^4 (-1)^{j_{\ell}(\vec{c}_1)} |\vec{c}_1\rangle$$

$$|\psi_1\rangle = \frac{1}{2} (-|11\rangle + |12\rangle + |13\rangle + |14\rangle)$$

$$|\psi_2\rangle = \frac{1}{2} (|11\rangle - |12\rangle + |13\rangle + |14\rangle)$$

$$|\psi_3\rangle = \frac{1}{2} (|11\rangle + |12\rangle - |13\rangle + |14\rangle)$$

$$|\psi_4\rangle = \frac{1}{2} (|11\rangle + |12\rangle + |13\rangle - |14\rangle)$$

$$2B\bar{c}) \quad \langle \psi_1 | \psi_2 \rangle = \frac{1}{4} (-1 - 1 + 1 + 1) = 0$$

$$\langle \psi_1 | \psi_3 \rangle = \frac{1}{4} (-1 + 1 - 1 + 1) = 0$$

$$\langle \psi_1 | \psi_4 \rangle = \frac{1}{4} (-1 + 1 + 1 - 1) = 0$$

$$\text{etc.} \quad \langle \psi_\ell | \psi_{\ell'} \rangle = \delta_{\ell\ell'}$$