

31st Eigenvector

$$N_e = 3 \quad s = \frac{1}{2} \quad m_s = -\frac{1}{2}$$

Irred. Representation : $\Gamma_{3,2}$

$$E_{31} = \frac{A_8}{3}$$

$$\begin{aligned} |\Psi_{31}\rangle &= |3, \frac{1}{2}, -\frac{1}{2}, \Gamma_{3,2}\rangle \\ &= C_{31,1} (|02d\rangle + |0d2\rangle) \\ &+ C_{31,2} (|20d\rangle + |2d0\rangle) \\ &+ C_{31,3} (|d02\rangle + |d20\rangle) \\ &+ C_{31,4} (|ddu\rangle - |dud\rangle) \end{aligned}$$

$$\begin{aligned} C_{31-1} &= \frac{1}{6}t(2J - 9t + 2U) \\ &+ \left(\frac{1}{6}t \left(2(U - W) + (\cos(\theta_1) + \sqrt{3}\sin(\theta_1)) \sqrt{A_2} \right) \right) \end{aligned}$$

$$\begin{aligned} C_{31-2} &= \frac{1}{12} \left(2J^2 + (-11t + 2U - 2W)J + 18t^2 - 2tU + 29tW - 18UW \right) \\ &+ \left(\frac{1}{36} \left(-2A_8^2 + (-9t + 6U + 30W)A_8 - 54W(U + 2W) - 3(2J + t) (\cos(\theta_1) + \sqrt{3}\sin(\theta_1)) \sqrt{A_2} \right) \right) \end{aligned}$$

$$\begin{aligned} C_{31-3} &= \frac{1}{12} \left(-2J^2 + (7t - 2U + 2W)J + 18W(U + 2W) - t(2U + 25W) \right) \\ &+ \left(\frac{1}{36} \left(108W^2 + 2A_8^2 + (9t - 6(U + 5W))A_8 + 3(2J - t) (\cos(\theta_1) + \sqrt{3}\sin(\theta_1)) \sqrt{A_2} \right) \right) \end{aligned}$$

$$\begin{aligned} C_{31-4} &= \frac{1}{2}t(J - 3t + U) \\ &+ \left(\frac{1}{2}t \left(U - W - (\cos(\theta_1) + \sqrt{3}\sin(\theta_1)) \sqrt{A_2} \right) \right) \end{aligned}$$

$$N_{31} = \sqrt{2} \sqrt{C_{31,1}^2 + C_{31,2}^2 + C_{31,3}^2 + C_{31,4}^2}$$