52^{nd} Eigenvector

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

Irred. Representation : $\boldsymbol{\Gamma_{4,2}}$

$$E_{52} = \frac{A_{21}}{3}$$

$$\begin{aligned}
|\Psi_{52}\rangle &= |3, \frac{1}{2}, -\frac{1}{2}, \Gamma_{4,2}\rangle \\
&= C_{52,1}\left(|002d\rangle - |00d2\rangle + |020d\rangle - |0d02\rangle - |20d0\rangle - |2d00\rangle + |d020\rangle + |d200\rangle\right) \\
&+ C_{52,2}\left(|02d0\rangle + |0d20\rangle - |200d\rangle - |d002\rangle\right) \\
&+ C_{52,3}\left(|0dud\rangle - |0udd\rangle + |d0du\rangle + |dd0u\rangle + |ddu0\rangle - |dud0\rangle - |u0dd\rangle - |ud0d\rangle\right)
\end{aligned}$$

$$\begin{aligned}
C_{52-1} &= \frac{t(-J + 4t - U)}{2\sqrt{2}} \\
&+ \left(\frac{t\left(-U + 2W + \left(\cos(\theta_4) + \sqrt{3}\sin(\theta_4)\right)\sqrt{A_5}\right)}{2\sqrt{2}}\right) \\
C_{52-2} &= \frac{t(J + 12t + U)}{3\sqrt{2}} \\
&+ \left(\frac{t\left(U - 2W - \left(\cos(\theta_4) + \sqrt{3}\sin(\theta_4)\right)\sqrt{A_5}\right)}{3\sqrt{2}}\right) \\
C_{52-3} &= -\frac{-4t^2 + (U + 4W)t + (U + 4W)^2 + \frac{A_{21}^2}{9} - \frac{1}{3}(t + 2U + 8W)A_{21}}{2\sqrt{2}} \\
N_{52} &= 2\sqrt{2C_{52,1}^2 + C_{52,2}^2 + 2C_{52,3}^2}
\end{aligned}$$