116^{th} Eigenvector

$N_e = 4 \qquad s = 0 \qquad m_s = 0$

Irred. Representation : $\boldsymbol{\Gamma_{3,1}}$

$$E_{116} = -J + U + 10W + \left(\frac{\cos(\theta_1)}{\sqrt{3}} + \sin(\theta_1)\right)\sqrt{A_1}$$

$$\begin{aligned}
|\Psi_{116}\rangle &= |4,0,0,\Gamma_{3,1}\rangle \\
&= C_{116,1}\left(|0022\rangle + |0220\rangle + |2002\rangle + |2200\rangle\right) \\
&+ C_{116,2}\left(|0202\rangle + |2020\rangle\right) \\
&+ C_{116,3}\left(|02du\rangle - |02ud\rangle + |0du2\rangle - |0ud2\rangle + |20du\rangle - |20ud\rangle + |2du0\rangle - |2ud0\rangle\right. \\
&\qquad \left. + |d02u\rangle + |d20u\rangle + |du02\rangle + |du20\rangle - |u02d\rangle - |u20d\rangle - |ud02\rangle - |ud20\rangle\right) \\
&+ C_{116,4}\left(|0d2u\rangle - |0u2d\rangle + |2d0u\rangle - |2u0d\rangle + |d0u2\rangle + |d2u0\rangle - |u0d2\rangle - |u2d0\rangle\right) \\
&+ C_{116,5}\left(|dduu\rangle - |duud\rangle - |uddu\rangle + |uudd\rangle\right)
\end{aligned}$$

$$\begin{aligned}
C_{116-1} &= \frac{t(J+U)}{\sqrt{3}} \\
&+ \left(\frac{1}{3}t\left(\sqrt{3}(U-2W) + \left(\cos(\theta_1) + \sqrt{3}\sin(\theta_1)\right)\sqrt{A_1}\right)\right) \\
C_{116-2} &= -\frac{2t(J+U)}{\sqrt{3}} \\
&+ \left(-\frac{2}{3}t\left(\sqrt{3}(U-2W) + \left(\cos(\theta_1) + \sqrt{3}\sin(\theta_1)\right)\sqrt{A_1}\right)\right) \\
C_{116-3} &= -\frac{J^2 + 2(U-2W)J + U^2}{4\sqrt{3}} \\
&+ \left(\frac{1}{36}\left(12\sqrt{3}(J+U-W)W + \left(-\sqrt{3}\cos(2\theta_1) + 3\sin(2\theta_1) + 2\sqrt{3}\right)A_1\right)\right)
\end{aligned}$$

$$
\begin{aligned}
C_{116-4} &= \frac{J^2 + 2(U-2W)J + U^2}{2\sqrt{3}} \\
&\quad + \left(\frac{1}{18}\left(\left(\sqrt{3}\cos(2\theta_1) - 3\sin(2\theta_1) - 2\sqrt{3}\right)A_1 - 12\sqrt{3}(J+U-W)W\right)\right) \\
C_{116-5} &= \sqrt{3}t(J+U) \\
&\quad + \left(t\left(\sqrt{3}(U-2W) - \left(\cos(\theta_1) + \sqrt{3}\sin(\theta_1)\right)\sqrt{A_1}\right)\right) \\
N_{116} &= \sqrt{4C_{116,1}^2 + 2C_{116,2}^2 + 16C_{116,3}^2 + 8C_{116,4}^2 + 4C_{116,5}^2}
\end{aligned}
$$