Irreducible angular momentum and spin eigenspaces on atomic subshells

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Reference:
Christian B. Mendl. *Efficient algorithm for many-electron angular momentum and spin diagonalization on atomic subshells.* arXiv:1409.6860 (2014)

config	sym	L_z	S_z	Ψ
$\wedge^1 V_\mathrm{s}$	$^2\mathrm{S}$	0	$\frac{1}{2}$	$\lvert \mathrm{s} \rangle$
$\wedge^2 V_\mathrm{s}$	$^1\mathrm{S}$	0	0	$\lvert \mathrm{s}\bar{\mathrm{s}} \rangle$
$\wedge^1 V_\mathrm{p}$	$^2\mathrm{P^o}$	1	$\frac{1}{2}$	$\lvert \mathrm{p}_1 \rangle$
$\wedge^2 V_\mathrm{p}$	$^1\mathrm{D}$	2	0	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1} \rangle$
	$^3\mathrm{P}$	1	1	$\lvert \mathrm{p}_1\mathrm{p}_0 \rangle$
	$^1\mathrm{S}$	0	0	$\frac{1}{\sqrt{3}}\left(-\lvert \mathrm{p}_1\overline{\mathrm{p}_{-1}} \rangle + \lvert \overline{\mathrm{p}_1}\mathrm{p}_{-1} \rangle + \lvert \mathrm{p}_0\overline{\mathrm{p}_0} \rangle\right)$
$\wedge^3 V_\mathrm{p}$	$^2\mathrm{D^o}$	2	$\frac{1}{2}$	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_0 \rangle$
	$^2\mathrm{P^o}$	1	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}\left(\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_{-1} \rangle + \lvert \mathrm{p}_1\mathrm{p}_0\overline{\mathrm{p}_0} \rangle\right)$
	$^4\mathrm{S^o}$	0	$\frac{3}{2}$	$\lvert \mathrm{p}_1\mathrm{p}_0\mathrm{p}_{-1} \rangle$
$\wedge^4 V_\mathrm{p}$	$^1\mathrm{D}$	2	0	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_0\overline{\mathrm{p}_0} \rangle$
	$^3\mathrm{P}$	1	1	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_0\mathrm{p}_{-1} \rangle$
	$^1\mathrm{S}$	0	0	$\frac{1}{\sqrt{3}}\left(-\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_{-1}\overline{\mathrm{p}_{-1}} \rangle - \lvert \mathrm{p}_1\mathrm{p}_0\overline{\mathrm{p}_0\mathrm{p}_{-1}} \rangle + \lvert \overline{\mathrm{p}_1}\mathrm{p}_0\overline{\mathrm{p}_0}\mathrm{p}_{-1} \rangle\right)$
$\wedge^5 V_\mathrm{p}$	$^2\mathrm{P^o}$	1	$\frac{1}{2}$	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_0\overline{\mathrm{p}_0}\mathrm{p}_{-1} \rangle$
$\wedge^6 V_\mathrm{p}$	$^1\mathrm{S}$	0	0	$\lvert \mathrm{p}_1\overline{\mathrm{p}_1}\mathrm{p}_0\overline{\mathrm{p}_0}\mathrm{p}_{-1}\overline{\mathrm{p}_{-1}} \rangle$
$\wedge^1 V_\mathrm{d}$	$^2\mathrm{D}$	2	$\frac{1}{2}$	$\lvert \mathrm{d}_2 \rangle$
$\wedge^2 V_\mathrm{d}$	$^1\mathrm{G}$	4	0	$\lvert \mathrm{d}_2\overline{\mathrm{d}_2} \rangle$
	$^3\mathrm{F}$	3	1	$\lvert \mathrm{d}_2\mathrm{d}_1 \rangle$
	$^1\mathrm{D}$	2	0	$\frac{1}{\sqrt{7}}\left(-\sqrt{2}\cdot\lvert \mathrm{d}_2\overline{\mathrm{d}_0} \rangle + \sqrt{2}\cdot\lvert \overline{\mathrm{d}_2}\mathrm{d}_0 \rangle + \sqrt{3}\cdot\lvert \mathrm{d}_1\overline{\mathrm{d}_1} \rangle\right)$
	$^3\mathrm{P}$	1	1	$\frac{1}{\sqrt{5}}\left(-\sqrt{2}\cdot\lvert \mathrm{d}_2\mathrm{d}_{-1} \rangle + \sqrt{3}\cdot\lvert \mathrm{d}_1\mathrm{d}_0 \rangle\right)$
	$^1\mathrm{S}$	0	0	$\frac{1}{\sqrt{5}}\left(\lvert \mathrm{d}_2\overline{\mathrm{d}_{-2}} \rangle - \lvert \overline{\mathrm{d}_2}\mathrm{d}_{-2} \rangle - \lvert \mathrm{d}_1\overline{\mathrm{d}_{-1}} \rangle + \lvert \overline{\mathrm{d}_1}\mathrm{d}_{-1} \rangle + \lvert \mathrm{d}_0\overline{\mathrm{d}_0} \rangle\right)$
$\wedge^3 V_\mathrm{d}$	$^2\mathrm{H}$	5	$\frac{1}{2}$	$\lvert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1 \rangle$
	$^2\mathrm{G}$	4	$\frac{1}{2}$	$\frac{1}{\sqrt{5}}\left(\sqrt{2}\cdot\lvert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0 \rangle + \sqrt{3}\cdot\lvert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1} \rangle\right)$
	$^4\mathrm{F}$	3	$\frac{3}{2}$	$\lvert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0 \rangle$
	$^2\mathrm{F}$	3	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}\left(\sqrt{6}\cdot\lvert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{-1} \rangle - \lvert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0} \rangle - \lvert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0 \rangle + 2\cdot\lvert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0 \rangle\right)$
	$^2\mathrm{D}$	2	$\frac{1}{2}$	$\frac{1}{2}\left(-\lvert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{-2} \rangle - \lvert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_{-1}} \rangle + \lvert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_{-1} \rangle + \lvert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_0} \rangle\right)$
	$^2\mathrm{D}$	2	$\frac{1}{2}$	$\frac{1}{2\sqrt{21}}\left(5\cdot\lvert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{-2} \rangle - 3\cdot\lvert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_{-1}} \rangle - \lvert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_{-1} \rangle + 3\cdot\lvert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_0} \rangle + 4\cdot\lvert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1} \rangle + 2\sqrt{6}\cdot\lvert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0 \rangle\right)$

Table 1: Irreducible LS eigenspaces, showing states with maximal L_z, S_z only

config	sym	L_z	S_z	Ψ
	^{4}P	1	$\frac{3}{2}$	$\frac{1}{\sqrt{5}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{2}P	1	$\frac{1}{2}$	$\frac{1}{\sqrt{210}}\left(4\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_{\text{-}2}}\right\rangle-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle-4\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left.-2\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}2}\right\rangle+5\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle+3\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle+3\sqrt{3}\cdot\left\vert \mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
$\wedge^4V_{\mathrm{d}}$	^{1}I	6	0	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\right\rangle$
	^{3}H	5	1	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\right\rangle$
	^{3}G	4	1	$\frac{1}{\sqrt{5}}\left(\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}1}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\right\rangle\right)$
	^{1}G	4	0	$\frac{1}{\sqrt{3}}\left(-\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{\text{-}1}}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{1}G	4	0	$\frac{1}{\sqrt{66}}\left(-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{\text{-}1}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle-2\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right.$ $\left.-3\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\right\rangle+3\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\right\rangle\right)$
	^{3}F	3	1	$\frac{1}{\sqrt{3}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}2}\right\rangle+\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle+\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{3}F	3	1	$\frac{1}{2\sqrt{3}}\left(-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle+\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left.+\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{1}F	3	0	$\frac{1}{2\sqrt{10}}\left(-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{\text{-}2}}\right\rangle+2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_{\text{-}1}}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle$ $\left.+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{5}D	2	2	$\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle$
	^{3}D	2	1	$\frac{1}{2\sqrt{21}}\left(4\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle+2\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle-3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left.-3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle+5\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{1}D	2	0	$\frac{1}{\sqrt{42}}\left(-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle+2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_{\text{-}2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle$ $+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle-\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle$ $\left.+2\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{1}D	2	0	$\frac{1}{\sqrt{21}}\left(\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_{\text{-}2}}\right\rangle\right.$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle-\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle$ $+\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle-\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{3}P	1	1	$\frac{1}{5}\left(2\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle$ $\left.+\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$

Table 2: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	^{3}P	1	1	$\frac{1}{5\sqrt{14}}\left(3\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle - 6\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle + \sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left. +6\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle + \sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle + 5\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left. +4\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle + 4\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{5\sqrt{3}}\left(4\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + 2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left. +\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle + 2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left. -\sqrt{6}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle + \sqrt{6}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \sqrt{6}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left. +\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle + 3\cdot\left\vert \mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\right\rangle - 3\cdot\left\vert \overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{5\sqrt{7}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + 5\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}}\right\rangle - 3\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle\right.$ $\left. -2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle - 5\cdot\left\vert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}2}}\right\rangle - \sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left. -2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 3\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle + 5\cdot\left\vert \overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left. +5\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle + \sqrt{6}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle - \sqrt{6}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle\right.$ $\left. +\sqrt{6}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle + 4\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle + 2\cdot\left\vert \mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left. -2\cdot\left\vert \overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
$\wedge^5 V_{\mathrm{d}}$	^{2}I	6	$\frac{1}{2}$	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\right\rangle$
	^{2}H	5	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\right\rangle + \left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{4}G	4	$\frac{3}{2}$	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle$
	^{2}G	4	$\frac{1}{2}$	$\frac{1}{\sqrt{39}}\left(3\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle - \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle - \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left. +2\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{2}G	4	$\frac{1}{2}$	$\frac{1}{\sqrt{715}}\left(2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\right\rangle + 8\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle - 5\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left. -3\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle + 13\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle\right)$
	^{4}F	3	$\frac{3}{2}$	$\frac{1}{\sqrt{2}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle + \left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{2}F	3	$\frac{1}{2}$	$\frac{1}{6}\left(-4\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle + 2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle + \sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left. +2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle - \left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle - \left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right.$ $\left. +2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{2}F	3	$\frac{1}{2}$	$\frac{1}{6\sqrt{5}}\left(2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle - 2\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left. -\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle - 3\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle - 4\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right.$ $\left. -4\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle + 8\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle\right)$

Table 3: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	^{4}D	2	$\frac{3}{2}$	$\frac{1}{\sqrt{7}}\left(\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle\right)$
	^{2}D	2	$\frac{1}{2}$	$\frac{1}{2\sqrt{6}}\left(-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle+2\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle\right.$ $\left.+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\right\rangle\right.$ $\left.+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-2}\right\rangle+\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle\right)$
	^{2}D	2	$\frac{1}{2}$	$\frac{1}{2\sqrt{210}}\left(3\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-2\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle\right.$ $-7\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle-8\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle+3\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-2}}\right\rangle$ $-8\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle-8\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle-5\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\right\rangle$ $\left.+5\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-2}\right\rangle+5\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle\right)$
	^{2}D	2	$\frac{1}{2}$	$\frac{1}{\sqrt{105}}\left(-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+4\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle\right.$ $-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle+\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle-\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-2}}\right\rangle$ $+\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle-3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle-5\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\right\rangle$ $\left.+5\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle\right)$
	^{4}P	1	$\frac{3}{2}$	$\frac{1}{\sqrt{10}}\left(\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle\right.$ $\left.+\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$
	^{2}P	1	$\frac{1}{2}$	$\frac{1}{2\sqrt{105}}\left(6\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle-5\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+4\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle\right.$ $+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $+\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-2}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle$ $+4\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle$ $\left.-5\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle+6\sqrt{3}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle\right)$
	^{6}S	0	$\frac{5}{2}$	$\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle$
	^{2}S	0	$\frac{1}{2}$	$\frac{1}{\sqrt{210}}\left(4\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle+2\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle+2\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle\right.$ $-3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle-3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+3\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_0\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $+\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle-\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle+3\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle$ $+2\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle+5\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $-3\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle-3\cdot\left\vert \overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+2\sqrt{6}\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle$ $\left.+4\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$

Table 4: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
$\wedge^6 V_\mathrm{d}$	^{1}I	6	0	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\right\rangle$
	^{3}H	5	1	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\right\rangle$
	^{3}G	4	1	$\frac{1}{\sqrt{5}}\left(\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{1}G	4	0	$\frac{1}{2\sqrt{2}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left.+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{1}G	4	0	$\frac{1}{2\sqrt{22}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $-3\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle-4\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\right\rangle$ $\left.+4\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{3}F	3	1	$\frac{1}{2\sqrt{2}}\left(\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left.+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{3}F	3	1	$\frac{1}{2\sqrt{6}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $\left.-\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle+4\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{1}F	3	0	$\frac{1}{2\sqrt{10}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle$ $+\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle$ $\left.-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\right\rangle+2\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\right\rangle\right)$
	^{5}D	2	2	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle$
	^{3}D	2	1	$\frac{1}{2\sqrt{21}}\left(5\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right.$ $-3\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle-3\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle$ $\left.+2\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle+4\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{1}D	2	0	$\frac{1}{\sqrt{21}}\left(\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}}\right\rangle\right.$ $+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}2}}\right\rangle$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle$ $\left.+\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{1}D	2	0	$\frac{1}{\sqrt{42}}\left(-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle\right.$ $-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle$ $+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle$ $-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}2}}\right\rangle-\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle$ $\left.+\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\right\rangle+\sqrt{2}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$

Table 5: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	^{3}P	1	1	$\frac{1}{5\sqrt{2}}\left(2\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle\right.$ $+2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $\left.-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle+3\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$
	^{3}P	1	1	$\frac{1}{5\sqrt{7}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle-3\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle\right.$ $-5\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle-\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle$ $-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle$ $\left.+\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle+5\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{\sqrt{55}}\left(2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle\right.$ $+\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle-\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $+\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle+\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle$ $+\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle+\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle$ $-2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-\sqrt{6}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle$ $-\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle$ $+\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle+\left\vert \overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle$ $\left.-3\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{\sqrt{1155}}\left(9\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle-9\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_{-1}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle\right.$ $-11\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle-\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle$ $+\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle-\sqrt{6}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle$ $-12\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle-12\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}}\right\rangle$ $+10\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $+\sqrt{6}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-2}\overline{\mathrm{d}_{-2}}\right\rangle+12\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $+2\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-2}}\right\rangle+10\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{-1}}\mathrm{d}_{-2}\right\rangle$ $\left.-12\cdot\left\vert \overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle-8\cdot\left\vert \mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$
$\wedge^7V_\mathrm{d}$	^{2}H	5	$\frac{1}{2}$	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-1}\right\rangle$
	^{2}G	4	$\frac{1}{2}$	$\frac{1}{\sqrt{5}}\left(\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{-2}\right\rangle+\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\overline{\mathrm{d}_{-1}}\right\rangle\right)$
	^{4}F	3	$\frac{3}{2}$	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{-1}\mathrm{d}_{-2}\right\rangle$

Table 6: Irreducible LS-eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	^{2}F	3	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}\left(2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle - \left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle + \sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{2}D	2	$\frac{1}{2}$	$\frac{1}{\sqrt{15}}\left(\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle + 2\sqrt{2}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{2}D	2	$\frac{1}{2}$	$\frac{1}{\sqrt{70}}\left(-\sqrt{6}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 5\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle - 2\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 3\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle + 5\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle + \left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle\right)$
	^{4}P	1	$\frac{3}{2}$	$\frac{1}{\sqrt{5}}\left(-\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle + \sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle\right)$
	^{2}P	1	$\frac{1}{2}$	$\frac{1}{\sqrt{210}}\left(3\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + 3\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + 5\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}}\right\rangle - \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle - 4\sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle - 2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - 2\sqrt{3}\cdot\left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle + 4\sqrt{3}\cdot\left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle\right)$
$\wedge^8 V_\mathrm{d}$	^{1}G	4	0	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\right\rangle$
	^{3}F	3	1	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\right\rangle$
	^{1}D	2	0	$\frac{1}{\sqrt{7}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}}\right\rangle + \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right)$
	^{3}P	1	1	$\frac{1}{\sqrt{5}}\left(-\sqrt{3}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + \sqrt{2}\cdot\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{\sqrt{5}}\left(\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle + \left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \left\vert \mathrm{d}_2\overline{\mathrm{d}_2\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle - \left\vert \mathrm{d}_2\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}\mathrm{d}_{\text{-}2}}\right\rangle + \left\vert \overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle\right)$
$\wedge^9 V_\mathrm{d}$	^{2}D	2	$\frac{1}{2}$	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\right\rangle$
$\wedge^{10} V_\mathrm{d}$	^{1}S	0	0	$\left\vert \mathrm{d}_2\overline{\mathrm{d}_2}\mathrm{d}_1\overline{\mathrm{d}_1}\mathrm{d}_0\overline{\mathrm{d}_0}\mathrm{d}_{\text{-}1}\overline{\mathrm{d}_{\text{-}1}}\mathrm{d}_{\text{-}2}\overline{\mathrm{d}_{\text{-}2}}\right\rangle$
$\wedge^1 V_\mathrm{f}$	^{2}F$^\mathrm{o}$	3	$\frac{1}{2}$	$\left\vert \mathrm{f}_3\right\rangle$
$\wedge^2 V_\mathrm{f}$	^{1}I	6	0	$\left\vert \mathrm{f}_3\overline{\mathrm{f}_3}\right\rangle$
	^{3}H	5	1	$\left\vert \mathrm{f}_3\mathrm{f}_2\right\rangle$
	^{1}G	4	0	$\frac{1}{\sqrt{11}}\left(-\sqrt{3}\cdot\left\vert \mathrm{f}_3\overline{\mathrm{f}_1}\right\rangle + \sqrt{3}\cdot\left\vert \overline{\mathrm{f}_3}\mathrm{f}_1\right\rangle + \sqrt{5}\cdot\left\vert \mathrm{f}_2\overline{\mathrm{f}_2}\right\rangle\right)$

Table 7: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	^{3}F	3	1	$\frac{1}{\sqrt{3}}\left(-\left\|\mathrm{f}_3\mathrm{f}_0\right\rangle+\sqrt{2}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\right\rangle\right)$
	^{1}D	2	0	$\frac{1}{\sqrt{42}}\left(\sqrt{5}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_{-1}}\right\rangle-\sqrt{5}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_{-1}\right\rangle-\sqrt{10}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_0}\right\rangle+\sqrt{10}\cdot\left\|\overline{\mathrm{f}_2}\mathrm{f}_0\right\rangle+2\sqrt{3}\cdot\left\|\mathrm{f}_1\overline{\mathrm{f}_1}\right\rangle\right)$
	^{3}P	1	1	$\frac{1}{\sqrt{14}}\left(\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_{-2}\right\rangle-\sqrt{5}\cdot\left\|\mathrm{f}_2\mathrm{f}_{-1}\right\rangle+\sqrt{6}\cdot\left\|\mathrm{f}_1\mathrm{f}_0\right\rangle\right)$
	^{1}S	0	0	$\frac{1}{\sqrt{7}}\left(-\left\|\mathrm{f}_3\overline{\mathrm{f}_{-3}}\right\rangle+\left\|\overline{\mathrm{f}_3}\mathrm{f}_{-3}\right\rangle+\left\|\mathrm{f}_2\overline{\mathrm{f}_{-2}}\right\rangle-\left\|\overline{\mathrm{f}_2}\mathrm{f}_{-2}\right\rangle-\left\|\mathrm{f}_1\overline{\mathrm{f}_{-1}}\right\rangle+\left\|\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle+\left\|\mathrm{f}_0\overline{\mathrm{f}_0}\right\rangle\right)$
$\wedge^3V_\mathrm{f}$	^{2}K$^\mathrm{o}$	8	$\frac{1}{2}$	$\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_2\right\rangle$
	^{2}J$^\mathrm{o}$	7	$\frac{1}{2}$	$\frac{1}{2\sqrt{2}}\left(\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_1\right\rangle+\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_2}\right\rangle\right)$
	^{4}I$^\mathrm{o}$	6	$\frac{3}{2}$	$\left\|\mathrm{f}_3\mathrm{f}_2\mathrm{f}_1\right\rangle$
	^{2}I$^\mathrm{o}$	6	$\frac{1}{2}$	$\frac{1}{\sqrt{21}}\left(3\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_0\right\rangle-\sqrt{2}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_1}\right\rangle-\sqrt{2}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_1\right\rangle+2\sqrt{2}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_1\right\rangle\right)$
	^{2}H$^\mathrm{o}$	5	$\frac{1}{2}$	$\frac{1}{\sqrt{6}}\left(\sqrt{2}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-1}\right\rangle-\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_0\right\rangle+\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_0\right\rangle+\sqrt{2}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_1\right\rangle\right)$
	^{2}H$^\mathrm{o}$	5	$\frac{1}{2}$	$\frac{1}{\sqrt{273}}\left(-\sqrt{5}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-1}\right\rangle-3\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_0}\right\rangle+2\sqrt{10}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_0\right\rangle+6\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_1}\right\rangle+\sqrt{10}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_0\right\rangle+2\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_1\right\rangle\right)$
	^{4}G$^\mathrm{o}$	4	$\frac{3}{2}$	$\frac{1}{\sqrt{11}}\left(-\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\mathrm{f}_{-1}\right\rangle+\sqrt{6}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\mathrm{f}_0\right\rangle\right)$
	^{2}G$^\mathrm{o}$	4	$\frac{1}{2}$	$\frac{1}{7\sqrt{5}}\left(5\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-2}\right\rangle+\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-1}}\right\rangle-3\sqrt{5}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-1}\right\rangle-\sqrt{6}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_0}\right\rangle+\sqrt{6}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_0\right\rangle+2\sqrt{5}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_{-1}\right\rangle+2\sqrt{10}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_0\right\rangle+4\sqrt{3}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\overline{\mathrm{f}_1}\right\rangle\right)$
	^{2}G$^\mathrm{o}$	4	$\frac{1}{2}$	$\frac{1}{7\sqrt{429}}\left(-18\sqrt{6}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-2}\right\rangle+16\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-1}}\right\rangle+\sqrt{10}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-1}\right\rangle-32\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_0}\right\rangle-17\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_0\right\rangle-17\sqrt{10}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_{-1}\right\rangle+49\sqrt{3}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_1\mathrm{f}_0\right\rangle+15\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_0\right\rangle+15\sqrt{6}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\overline{\mathrm{f}_1}\right\rangle\right)$
	^{4}F$^\mathrm{o}$	3	$\frac{3}{2}$	$\frac{1}{2}\left(\left\|\mathrm{f}_3\mathrm{f}_2\mathrm{f}_{-2}\right\rangle-\left\|\mathrm{f}_3\mathrm{f}_1\mathrm{f}_{-1}\right\rangle+\sqrt{2}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\mathrm{f}_0\right\rangle\right)$
	^{2}F$^\mathrm{o}$	3	$\frac{1}{2}$	$\frac{1}{\sqrt{6}}\left(\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-3}\right\rangle+\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-2}}\right\rangle-\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-2}\right\rangle-\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_{-1}}\right\rangle+\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle+\left\|\mathrm{f}_3\mathrm{f}_0\overline{\mathrm{f}_0}\right\rangle\right)$
	^{2}F$^\mathrm{o}$	3	$\frac{1}{2}$	$\frac{1}{2\sqrt{33}}\left(7\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_3}\mathrm{f}_{-3}\right\rangle-3\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-2}}\right\rangle-2\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-2}\right\rangle+3\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_{-1}}\right\rangle-\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle-2\cdot\left\|\mathrm{f}_3\mathrm{f}_0\overline{\mathrm{f}_0}\right\rangle+5\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_{-2}\right\rangle-2\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_1\mathrm{f}_{-1}\right\rangle+\sqrt{15}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_{-1}\right\rangle-\sqrt{2}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\overline{\mathrm{f}_0}\right\rangle-\sqrt{2}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_1}\mathrm{f}_0\right\rangle+2\sqrt{2}\cdot\left\|\overline{\mathrm{f}_2}\mathrm{f}_1\mathrm{f}_0\right\rangle\right)$

Table 8: Irreducible LS eigenspaces (continued)

config	sym	L_z	S_z	Ψ
	$^4\mathrm{D}^\mathrm{o}$	2	$\frac{3}{2}$	$\frac{1}{\sqrt{21}}\left(\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\mathrm{f}_{-3}\right\rangle-\sqrt{6}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\mathrm{f}_{-2}\right\rangle+\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_0\mathrm{f}_{-1}\right\rangle\right)$
	$^2\mathrm{D}^\mathrm{o}$	2	$\frac{1}{2}$	$\frac{1}{2\sqrt{42}}\left(2\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-3}}\right\rangle-\sqrt{5}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-3}\right\rangle-2\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_{-2}}\right\rangle\right.$ $-\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_{-2}\right\rangle+\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_0\overline{\mathrm{f}_{-1}}\right\rangle+\sqrt{10}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_0}\mathrm{f}_{-1}\right\rangle$ $-\sqrt{5}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_{-3}\right\rangle+3\sqrt{3}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_1\mathrm{f}_{-2}\right\rangle-2\sqrt{10}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_0\mathrm{f}_{-1}\right\rangle$ $+2\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_{-2}\right\rangle-\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle+\sqrt{5}\cdot\left\|\overline{\mathrm{f}_2}\mathrm{f}_1\mathrm{f}_{-1}\right\rangle$ $\left.+\sqrt{6}\cdot\left\|\mathrm{f}_1\overline{\mathrm{f}_1}\mathrm{f}_0\right\rangle\right)$
	$^2\mathrm{D}^\mathrm{o}$	2	$\frac{1}{2}$	$\frac{1}{6\sqrt{154}}\left(-14\sqrt{5}\cdot\left\|\mathrm{f}_3\mathrm{f}_2\overline{\mathrm{f}_{-3}}\right\rangle+7\sqrt{5}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_2}\mathrm{f}_{-3}\right\rangle+14\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_1\overline{\mathrm{f}_{-2}}\right\rangle\right.$ $-13\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_{-2}\right\rangle-\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_0\overline{\mathrm{f}_{-1}}\right\rangle+5\sqrt{10}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_0}\mathrm{f}_{-1}\right\rangle$ $+7\sqrt{5}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_2\mathrm{f}_{-3}\right\rangle-\sqrt{3}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_1\mathrm{f}_{-2}\right\rangle-4\sqrt{10}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_0\mathrm{f}_{-1}\right\rangle$ $+6\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_{-2}\right\rangle-12\sqrt{5}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\overline{\mathrm{f}_{-1}}\right\rangle+3\sqrt{5}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle$ $\left.+12\sqrt{5}\cdot\left\|\mathrm{f}_2\mathrm{f}_0\overline{\mathrm{f}_0}\right\rangle+9\sqrt{5}\cdot\left\|\overline{\mathrm{f}_2}\mathrm{f}_1\mathrm{f}_{-1}\right\rangle+9\sqrt{6}\cdot\left\|\mathrm{f}_1\overline{\mathrm{f}_1}\mathrm{f}_0\right\rangle\right)$
	$^2\mathrm{P}^\mathrm{o}$	1	$\frac{1}{2}$	$\frac{1}{2\sqrt{21}}\left(\sqrt{6}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_1}\mathrm{f}_{-3}\right\rangle+\sqrt{3}\cdot\left\|\mathrm{f}_3\mathrm{f}_0\overline{\mathrm{f}_{-2}}\right\rangle-2\sqrt{3}\cdot\left\|\mathrm{f}_3\overline{\mathrm{f}_0}\mathrm{f}_{-2}\right\rangle\right.$ $-\sqrt{10}\cdot\left\|\mathrm{f}_3\mathrm{f}_{-1}\overline{\mathrm{f}_{-1}}\right\rangle-\sqrt{6}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_1\mathrm{f}_{-3}\right\rangle+\sqrt{3}\cdot\left\|\overline{\mathrm{f}_3}\mathrm{f}_0\mathrm{f}_{-2}\right\rangle$ $-\sqrt{10}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_2}\mathrm{f}_{-3}\right\rangle-\sqrt{6}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\overline{\mathrm{f}_{-2}}\right\rangle+\sqrt{6}\cdot\left\|\mathrm{f}_2\overline{\mathrm{f}_1}\mathrm{f}_{-2}\right\rangle$ $+\sqrt{5}\cdot\left\|\mathrm{f}_2\mathrm{f}_0\overline{\mathrm{f}_{-1}}\right\rangle-\sqrt{5}\cdot\left\|\overline{\mathrm{f}_2}\mathrm{f}_0\mathrm{f}_{-1}\right\rangle-\sqrt{6}\cdot\left\|\mathrm{f}_1\overline{\mathrm{f}_1}\mathrm{f}_{-1}\right\rangle$ $\left.-\sqrt{6}\cdot\left\|\mathrm{f}_1\mathrm{f}_0\overline{\mathrm{f}_0}\right\rangle\right)$
	$^4\mathrm{S}^\mathrm{o}$	0	$\frac{3}{2}$	$\frac{1}{\sqrt{7}}\left(-\left\|\mathrm{f}_3\mathrm{f}_0\mathrm{f}_{-3}\right\rangle+\sqrt{2}\cdot\left\|\mathrm{f}_3\mathrm{f}_{-1}\mathrm{f}_{-2}\right\rangle+\sqrt{2}\cdot\left\|\mathrm{f}_2\mathrm{f}_1\mathrm{f}_{-3}\right\rangle\right.$ $\left.-\left\|\mathrm{f}_2\mathrm{f}_0\mathrm{f}_{-2}\right\rangle+\left\|\mathrm{f}_1\mathrm{f}_0\mathrm{f}_{-1}\right\rangle\right)$

Table 9: Irreducible LS eigenspaces (continued)