

\* symmetry operation

Table 1: Symmetry operations for 3d polar vector.

| No. | tag   | matrix (polar)   | det | TR |
|-----|---|--|-----|----|
| 1   | $\{1 0\}$   | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$                                  | 1   | 1  |
| 2   | $\{4_{100}^+ \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 3   | $\{4_{100}^- \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 4   | $\{4_{010}^+ \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 5   | $\{4_{010}^- \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 6   | $\{4_{001}^+ \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 7   | $\{4_{001}^- \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 8   | $\{2_{100} 0\}$                                   | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$                                | 1   | 1  |
| 9   | $\{2_{010} 0\}$                                   | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$                                | 1   | 1  |
| 10  | $\{2_{001} 0\}$                                   | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$                                | 1   | 1  |
| 11  | $\{2_{110} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 12  | $\{2_{1-10} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$  | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 13  | $\{2_{011} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |

*continued ...*

Table 1

| No. | tag  | matrix (polar)   | det | TR |
|-----|--|--|-----|----|
| 14  | $\{2_{01-1} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 15  | $\{2_{101} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$    | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 16  | $\{2_{-101} \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 17  | $\{3_{111}^+ 0\}$                                  | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$                                  | 1   | 1  |
| 18  | $\{3_{111}^- 0\}$                                  | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$                                  | 1   | 1  |
| 19  | $\{3_{1-1-1}^- 0\}$                                | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 20  | $\{3_{1-1-1}^+ 0\}$                                | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 21  | $\{3_{-11-1}^- 0\}$                                | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 22  | $\{3_{-11-1}^+ 0\}$                                | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 23  | $\{3_{-1-11}^- 0\}$                                | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 24  | $\{3_{-1-11}^+ 0\}$                                | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$                                | 1   | 1  |
| 25  | $\{-1' 0\}$  | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$                               | -1  | -1 |
| 26  | $\{-4_{100}^+ \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 27  | $\{-4_{100}^- \frac{1}{2}\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |

continued ...

Table 1

| No. | tag  | matrix (polar)  | det | TR |
|-----|--|---|-----|----|
| 28  | $\{-4_{010}^+{}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 29  | $\{-4_{010}^-{}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 30  | $\{-4_{001}^+{}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 31  | $\{-4_{001}^-{}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 32  | $\{m_{100}' 0\}$   | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$                                | -1  | -1 |
| 33  | $\{m_{010}' 0\}$   | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$                                | -1  | -1 |
| 34  | $\{m_{001}' 0\}$   | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$                                | -1  | -1 |
| 35  | $\{m_{110}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$      | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 36  | $\{m_{1-10}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$     | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 37  | $\{m_{011}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$      | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 38  | $\{m_{01-1}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$     | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 39  | $\{m_{101}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$      | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 40  | $\{m_{-101}' _{\frac{1}{2}\frac{1}{2}\frac{1}{2}}\}$     | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 41  | $\{-3_{111}^+{}' 0\}$                                    | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$                              | -1  | -1 |

continued ...

Table 1

| No. | tag                             | matrix (polar)  | det | TR |
|-----|---------------------------------|---|-----|----|
| 42  | $\{-3_{111}^-' 0\}$             | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$                  | -1  | -1 |
| 43  | $\{-3_{1-1-1}^-' 0\}$           | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 44  | $\{-3_{1-1-1}^+ 0\}$            | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 45  | $\{-3_{-11-1}^-' 0\}$           | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 46  | $\{-3_{-11-1}^+ 0\}$            | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 47  | $\{-3_{-1-11}^-' 0\}$           | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 48  | $\{-3_{-1-11}^+ 0\}$            | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$                    | -1  | -1 |
| 49  | $\{1 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 50  | $\{4_{100}^+ \frac{1}{2}00\}$   | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 51  | $\{4_{100}^- \frac{1}{2}00\}$   | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 52  | $\{4_{010}^+ \frac{1}{2}00\}$   | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 53  | $\{4_{010}^- \frac{1}{2}00\}$   | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 54  | $\{4_{001}^+ \frac{1}{2}00\}$   | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$          | 1   | 1  |
| 55  | $\{4_{001}^- \frac{1}{2}00\}$   | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$          | 1   | 1  |

continued ...

Table 1

| No. | tag                                       | matrix (polar)  | det | TR |
|-----|---|---|-----|----|
| 56  | $\{2_{100} 0\frac{1}{2}\frac{1}{2}\}$     | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 57  | $\{2_{010} 0\frac{1}{2}\frac{1}{2}\}$     | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 58  | $\{2_{001} 0\frac{1}{2}\frac{1}{2}\}$     | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 59  | $\{2_{110} \frac{1}{2}00\}$               | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | 1   | 1  |
| 60  | $\{2_{1-10} \frac{1}{2}00\}$              | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$          | 1   | 1  |
| 61  | $\{2_{011} \frac{1}{2}00\}$               | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 62  | $\{2_{01-1} \frac{1}{2}00\}$              | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 63  | $\{2_{101} \frac{1}{2}00\}$               | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 64  | $\{2_{-101} \frac{1}{2}00\}$              | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 65  | $\{3_{111}^+ 0\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 66  | $\{3_{111}^- 0\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | 1   | 1  |
| 67  | $\{3_{1-1-1}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 68  | $\{3_{1-1-1}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 69  | $\{3_{-11-1}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |

continued ...

Table 1

| No. | tag                                       | matrix (polar)   | det | TR |
|-----|---|--|-----|----|
| 70  | $\{3_{-11-1}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 71  | $\{3_{-1-11}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 72  | $\{3_{-1-11}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 73  | $\{-1' 0\frac{1}{2}\frac{1}{2}\}$         | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 74  | $\{-4_{100}^+{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 75  | $\{-4_{100}^-{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 76  | $\{-4_{010}^+{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 77  | $\{-4_{010}^-{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 78  | $\{-4_{001}^+{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | -1  | -1 |
| 79  | $\{-4_{001}^-{}'  \frac{1}{2}00\}$        | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | -1  | -1 |
| 80  | $\{m_{100}' 0\frac{1}{2}\frac{1}{2}\}$    | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 81  | $\{m_{010}' 0\frac{1}{2}\frac{1}{2}\}$    | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 82  | $\{m_{001}' 0\frac{1}{2}\frac{1}{2}\}$    | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 83  | $\{m_{110}'  \frac{1}{2}00\}$             | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$            | -1  | -1 |

continued ...

Table 1

| No. | tag  | matrix (polar)   | det | TR |
|-----|--|--|-----|----|
| 84  | $\{m_{1-10}' \frac{1}{2}00\}$              | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$              | -1  | -1 |
| 85  | $\{m_{011}' \frac{1}{2}00\}$               | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 86  | $\{m_{01-1}' \frac{1}{2}00\}$              | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$              | -1  | -1 |
| 87  | $\{m_{101}' \frac{1}{2}00\}$               | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 88  | $\{m_{-101}' \frac{1}{2}00\}$              | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$              | -1  | -1 |
| 89  | $\{-3_{111}^+ 0\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 90  | $\{-3_{111}^- 0\frac{1}{2}\frac{1}{2}\}$   | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 91  | $\{-3_{1-1-1}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 92  | $\{-3_{1-1-1}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 93  | $\{-3_{-11-1}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 94  | $\{-3_{-11-1}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 95  | $\{-3_{-1-11}^- 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 96  | $\{-3_{-1-11}^+ 0\frac{1}{2}\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 97  | $\{1 \frac{1}{2}0\frac{1}{2}\}$            | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$    | 1   | 1  |

continued ...

Table 1

| No. | tag                                   | matrix (polar)  | det | TR |
|-----|---------------------------------------|---|-----|----|
| 98  | $\{4_{100}^+ 0\frac{1}{2}0\}$         | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 99  | $\{4_{100}^- 0\frac{1}{2}0\}$         | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 100 | $\{4_{010}^+ 0\frac{1}{2}0\}$         | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 101 | $\{4_{010}^- 0\frac{1}{2}0\}$         | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 102 | $\{4_{001}^+ 0\frac{1}{2}0\}$         | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$            | 1   | 1  |
| 103 | $\{4_{001}^- 0\frac{1}{2}0\}$         | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$            | 1   | 1  |
| 104 | $\{2_{100} \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 105 | $\{2_{010} \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 106 | $\{2_{001} \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$ | 1   | 1  |
| 107 | $\{2_{110} 0\frac{1}{2}0\}$           | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | 1   | 1  |
| 108 | $\{2_{1-10} 0\frac{1}{2}0\}$          | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$          | 1   | 1  |
| 109 | $\{2_{011} 0\frac{1}{2}0\}$           | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$            | 1   | 1  |
| 110 | $\{2_{01-1} 0\frac{1}{2}0\}$          | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$          | 1   | 1  |
| 111 | $\{2_{101} 0\frac{1}{2}0\}$           | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$            | 1   | 1  |

continued ...



Table 1

| No. | tag                                       | matrix (polar)   | det | TR |
|-----|---|--|-----|----|
| 112 | $\{2_{-101} 0\frac{1}{2}0\}$              | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$           | 1   | 1  |
| 113 | $\{3_{111}^+ \frac{1}{2}0\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$    | 1   | 1  |
| 114 | $\{3_{111}^- \frac{1}{2}0\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$    | 1   | 1  |
| 115 | $\{3_{1-1-1}^- \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 116 | $\{3_{1-1-1}^+ \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 117 | $\{3_{-11-1}^- \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 118 | $\{3_{-11-1}^+ \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 119 | $\{3_{-1-11}^- \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 120 | $\{3_{-1-11}^+ \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | 1   | 1  |
| 121 | $\{-1' \frac{1}{2}0\frac{1}{2}\}$         | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 122 | $\{-4_{100}^+' 0\frac{1}{2}0\}$           | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 123 | $\{-4_{100}^-' 0\frac{1}{2}0\}$           | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 124 | $\{-4_{010}^+' 0\frac{1}{2}0\}$           | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 125 | $\{-4_{010}^-' 0\frac{1}{2}0\}$           | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |

continued ...

Table 1

| No. | tag   | matrix (polar)   | det | TR |
|-----|---|--|-----|----|
| 126 | $\{-4_{001}^+{}' 0\frac{1}{2}0\}$             | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | -1  | -1 |
| 127 | $\{-4_{001}^-{}' 0\frac{1}{2}0\}$             | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$            | -1  | -1 |
| 128 | $\{m_{100}' \frac{1}{2}0\frac{1}{2}\}$        | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 129 | $\{m_{010}' \frac{1}{2}0\frac{1}{2}\}$        | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 130 | $\{m_{001}' \frac{1}{2}0\frac{1}{2}\}$        | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |
| 131 | $\{m_{110}' 0\frac{1}{2}0\}$                  | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$            | -1  | -1 |
| 132 | $\{m_{1-10}' 0\frac{1}{2}0\}$                 | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$              | -1  | -1 |
| 133 | $\{m_{011}' 0\frac{1}{2}0\}$                  | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 134 | $\{m_{01-1}' 0\frac{1}{2}0\}$                 | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$              | -1  | -1 |
| 135 | $\{m_{101}' 0\frac{1}{2}0\}$                  | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$            | -1  | -1 |
| 136 | $\{m_{-101}' 0\frac{1}{2}0\}$                 | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$              | -1  | -1 |
| 137 | $\{-3_{111}^+{}' \frac{1}{2}0\frac{1}{2}\}$   | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 138 | $\{-3_{111}^-{}' \frac{1}{2}0\frac{1}{2}\}$   | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | -1  | -1 |
| 139 | $\{-3_{1-1-1}^-{}' \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$   | -1  | -1 |

continued ...

Table 1

| No. | tag   | matrix (polar)  | det | TR |
|-----|---|---|-----|----|
| 140 | $\{-3_{-1-1}^{+}{}' \frac{1}{2}0\frac{1}{2}\}$  | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 141 | $\{-3_{-11-1}^{-}{}' \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 142 | $\{-3_{-11-1}^{+}{}' \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 143 | $\{-3_{-1-11}^{-}{}' \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 144 | $\{-3_{-1-11}^{+}{}' \frac{1}{2}0\frac{1}{2}\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$  | -1  | -1 |
| 145 | $\{1 \frac{1}{2}\frac{1}{2}0\}$                 | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$   | 1   | 1  |
| 146 | $\{4_{100}^{+} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 147 | $\{4_{100}^{-} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 148 | $\{4_{010}^{+} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 149 | $\{4_{010}^{-} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 150 | $\{4_{001}^{+} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 151 | $\{4_{001}^{-} 00\frac{1}{2}\}$                 | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 152 | $\{2_{100} \frac{1}{2}\frac{1}{2}0\}$           | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$ | 1   | 1  |
| 153 | $\{2_{010} \frac{1}{2}\frac{1}{2}0\}$           | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$ | 1   | 1  |

continued ...

Table 1

| No. | tag                                       | matrix (polar)  | det | TR |
|-----|---|---|-----|----|
| 154 | $\{2_{001} \frac{1}{2}\frac{1}{2}0\}$     | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$ | 1   | 1  |
| 155 | $\{2_{110} 00\frac{1}{2}\}$               | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 156 | $\{2_{1-10} 00\frac{1}{2}\}$              | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$          | 1   | 1  |
| 157 | $\{2_{011} 00\frac{1}{2}\}$               | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 158 | $\{2_{01-1} 00\frac{1}{2}\}$              | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$          | 1   | 1  |
| 159 | $\{2_{101} 00\frac{1}{2}\}$               | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | 1   | 1  |
| 160 | $\{2_{-101} 00\frac{1}{2}\}$              | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$          | 1   | 1  |
| 161 | $\{3_{111}^+ \frac{1}{2}\frac{1}{2}0\}$   | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$   | 1   | 1  |
| 162 | $\{3_{111}^- \frac{1}{2}\frac{1}{2}0\}$   | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$   | 1   | 1  |
| 163 | $\{3_{1-1-1}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$ | 1   | 1  |
| 164 | $\{3_{1-1-1}^+ \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$ | 1   | 1  |
| 165 | $\{3_{-11-1}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$ | 1   | 1  |
| 166 | $\{3_{-11-1}^+ \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$ | 1   | 1  |
| 167 | $\{3_{-1-11}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$ | 1   | 1  |

continued ...

Table 1

| No. | tag                                       | matrix (polar)   | det | TR |
|-----|---|--|-----|----|
| 168 | $\{3^+_{-1-11} \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$  | 1   | 1  |
| 169 | $\{-1'^{ \frac{1}{2}\frac{1}{2}0\}$       | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$ | -1  | -1 |
| 170 | $\{-4^+_{100}' 00\frac{1}{2}\}$           | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 171 | $\{-4^-_{100}' 00\frac{1}{2}\}$           | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 172 | $\{-4^+_{010}' 00\frac{1}{2}\}$           | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 173 | $\{-4^-_{010}' 00\frac{1}{2}\}$           | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 174 | $\{-4^+_{001}' 00\frac{1}{2}\}$           | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 175 | $\{-4^-_{001}' 00\frac{1}{2}\}$           | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 176 | $\{m_{100}' \frac{1}{2}\frac{1}{2}0\}$    | $\begin{bmatrix} -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$   | -1  | -1 |
| 177 | $\{m_{010}' \frac{1}{2}\frac{1}{2}0\}$    | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & 0 \end{bmatrix}$   | -1  | -1 |
| 178 | $\{m_{001}' \frac{1}{2}\frac{1}{2}0\}$    | $\begin{bmatrix} 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & 0 \end{bmatrix}$   | -1  | -1 |
| 179 | $\{m_{110}' 00\frac{1}{2}\}$              | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 180 | $\{m_{1-10}' 00\frac{1}{2}\}$             | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$              | -1  | -1 |
| 181 | $\{m_{011}' 00\frac{1}{2}\}$              | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |

continued ...

Table 1

| No. | tag  | matrix (polar)   | det | TR |
|-----|--|--|-----|----|
| 182 | $\{m_{01-1}' 00\frac{1}{2}\}$              | $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & \frac{1}{2} \end{bmatrix}$              | -1  | -1 |
| 183 | $\{m_{101}' 00\frac{1}{2}\}$               | $\begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$            | -1  | -1 |
| 184 | $\{m_{-101}' 00\frac{1}{2}\}$              | $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & \frac{1}{2} \end{bmatrix}$              | -1  | -1 |
| 185 | $\{-3_{111}^+ \frac{1}{2}\frac{1}{2}0\}$   | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$ | -1  | -1 |
| 186 | $\{-3_{111}^- \frac{1}{2}\frac{1}{2}0\}$   | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$ | -1  | -1 |
| 187 | $\{-3_{1-1-1}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$   | -1  | -1 |
| 188 | $\{-3_{1-1-1}^+ \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & -1 & 0 & 0 \end{bmatrix}$   | -1  | -1 |
| 189 | $\{-3_{-11-1}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & 0 \end{bmatrix}$   | -1  | -1 |
| 190 | $\{-3_{-11-1}^+ \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & -1 & \frac{1}{2} \\ 1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$   | -1  | -1 |
| 191 | $\{-3_{-1-11}^- \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & -1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & \frac{1}{2} \\ 1 & 0 & 0 & 0 \end{bmatrix}$   | -1  | -1 |
| 192 | $\{-3_{-1-11}^+ \frac{1}{2}\frac{1}{2}0\}$ | $\begin{bmatrix} 0 & 0 & 1 & \frac{1}{2} \\ -1 & 0 & 0 & \frac{1}{2} \\ 0 & 1 & 0 & 0 \end{bmatrix}$   | -1  | -1 |