

* 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 | $\{3_{001}^+ 00\frac{2}{3}\}$ | $\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$ | 1 | 1 |
| 3 | $\{3_{001}^- 00\frac{1}{3}\}$ | $\begin{bmatrix} -1 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$ | 1 | 1 |
| 4 | $\{2_{100}' 00\frac{1}{3}\}$ | $\begin{bmatrix} 1 & -1 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & \frac{1}{3} \end{bmatrix}$ | 1 | -1 |
| 5 | $\{2_{110}' 0\}$ | $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$ | 1 | -1 |
| 6 | $\{2_{010}' 00\frac{2}{3}\}$ | $\begin{bmatrix} -1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & \frac{2}{3} \end{bmatrix}$ | 1 | -1 |