PG No. 15 $D_{4\mathrm{h}}$ $4/mmm$ [tetragonal]

Table 1: Representation matrices

Irrep.						
A_{1g}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}1\end{bmatrix}$	$2_{010}:\begin{bmatrix}1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}1\end{bmatrix}$	$-1:\begin{bmatrix}1\end{bmatrix}$	$m_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}1\end{bmatrix}$	$m_{100}:\begin{bmatrix}1\end{bmatrix}$	$m_{110}:\begin{bmatrix}1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}1\end{bmatrix}$		
A_{2g}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}1\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1\end{bmatrix}$	$2_{100}:\begin{bmatrix}-1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}-1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}-1\end{bmatrix}$	$-1:\begin{bmatrix}1\end{bmatrix}$	$m_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}-1\end{bmatrix}$	$m_{100}:\begin{bmatrix}-1\end{bmatrix}$	$m_{110}:\begin{bmatrix}-1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}-1\end{bmatrix}$		
B_{1g}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$	$2_{010}:\begin{bmatrix}1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}-1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}-1\end{bmatrix}$	$-1:\begin{bmatrix}1\end{bmatrix}$	$m_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}1\end{bmatrix}$	$m_{100}:\begin{bmatrix}1\end{bmatrix}$	$m_{110}:\begin{bmatrix}-1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}-1\end{bmatrix}$		
B_{2g}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1\end{bmatrix}$	$2_{100}:\begin{bmatrix}-1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}1\end{bmatrix}$	$-1:\begin{bmatrix}1\end{bmatrix}$	$m_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}-1\end{bmatrix}$	$m_{100}:\begin{bmatrix}-1\end{bmatrix}$	$m_{110}:\begin{bmatrix}1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}1\end{bmatrix}$		
E_g	$1:\begin{bmatrix}1&0\\0&1\end{bmatrix}$	$2_{001}:\begin{bmatrix}-1&0\\0&-1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}0&1\\-1&0\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}0&-1\\1&0\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1&0\\0&1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1&0\\0&-1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}0&-1\\-1&0\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}0&1\\1&0\end{bmatrix}$	$-1:\begin{bmatrix}1&0\\0&1\end{bmatrix}$	$m_{001}:\begin{bmatrix}-1&0\\0&-1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}0&1\\-1&0\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}0&-1\\1&0\end{bmatrix}$
	$m_{010}:\begin{bmatrix}-1&0\\0&1\end{bmatrix}$	$m_{100}:\begin{bmatrix}1&0\\0&-1\end{bmatrix}$	$m_{110}:\begin{bmatrix}0&-1\\-1&0\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}0&1\\1&0\end{bmatrix}$		
A_{1u}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}1\end{bmatrix}$	$2_{010}:\begin{bmatrix}1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}1\end{bmatrix}$	$-1:\begin{bmatrix}-1\end{bmatrix}$	$m_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}-1\end{bmatrix}$	$m_{100}:\begin{bmatrix}-1\end{bmatrix}$	$m_{110}:\begin{bmatrix}-1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}-1\end{bmatrix}$		
A_{2u}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}1\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1\end{bmatrix}$	$2_{100}:\begin{bmatrix}-1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}-1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}-1\end{bmatrix}$	$-1:\begin{bmatrix}-1\end{bmatrix}$	$m_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}1\end{bmatrix}$	$m_{100}:\begin{bmatrix}1\end{bmatrix}$	$m_{110}:\begin{bmatrix}1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}1\end{bmatrix}$		
B_{1u}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$	$2_{010}:\begin{bmatrix}1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}-1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}-1\end{bmatrix}$	$-1:\begin{bmatrix}-1\end{bmatrix}$	$m_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}1\end{bmatrix}$
	$m_{010}:\begin{bmatrix}-1\end{bmatrix}$	$m_{100}:\begin{bmatrix}-1\end{bmatrix}$	$m_{110}:\begin{bmatrix}1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}1\end{bmatrix}$		
B_{2u}	$1:\begin{bmatrix}1\end{bmatrix}$	$2_{001}:\begin{bmatrix}1\end{bmatrix}$	$4^+_{001}:\begin{bmatrix}-1\end{bmatrix}$	$4^-_{001}:\begin{bmatrix}-1\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1\end{bmatrix}$	$2_{100}:\begin{bmatrix}-1\end{bmatrix}$
	$2_{110}:\begin{bmatrix}1\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}1\end{bmatrix}$	$-1:\begin{bmatrix}-1\end{bmatrix}$	$m_{001}:\begin{bmatrix}-1\end{bmatrix}$	$-4^+_{001}:\begin{bmatrix}1\end{bmatrix}$	$-4^-_{001}:\begin{bmatrix}1\end{bmatrix}$

Table 1

Irrep.						
	$m_{010}:\begin{bmatrix}1\end{bmatrix}$	$m_{100}:\begin{bmatrix}1\end{bmatrix}$	$m_{110}:\begin{bmatrix}-1\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}-1\end{bmatrix}$		
E_u $1:\begin{bmatrix}1&0\\0&1\end{bmatrix}$	$2_{001}:\begin{bmatrix}-1&0\\0&-1\end{bmatrix}$	$4^{+}_{001}:\begin{bmatrix}0&-1\\1&0\end{bmatrix}$	$4^{-}_{001}:\begin{bmatrix}0&1\\-1&0\end{bmatrix}$	$2_{010}:\begin{bmatrix}-1&0\\0&1\end{bmatrix}$	$2_{100}:\begin{bmatrix}1&0\\0&-1\end{bmatrix}$	
$2_{110}:\begin{bmatrix}0&1\\1&0\end{bmatrix}$	$2_{1-10}:\begin{bmatrix}0&-1\\-1&0\end{bmatrix}$	$-1:\begin{bmatrix}-1&0\\0&-1\end{bmatrix}$	$m_{001}:\begin{bmatrix}1&0\\0&1\end{bmatrix}$	$-4^{+}_{001}:\begin{bmatrix}0&1\\-1&0\end{bmatrix}$	$-4^{-}_{001}:\begin{bmatrix}0&-1\\1&0\end{bmatrix}$	
$m_{010}:\begin{bmatrix}1&0\\0&-1\end{bmatrix}$	$m_{100}:\begin{bmatrix}-1&0\\0&1\end{bmatrix}$	$m_{110}:\begin{bmatrix}0&-1\\-1&0\end{bmatrix}$	$m_{1-10}:\begin{bmatrix}0&1\\1&0\end{bmatrix}$			