

MPG No. 29.3.111  $m' \bar{3}'$  [ Type III, cubic ] [M tensor]

\* Rank 0 tensor.

$$[M]$$

$$M = M_s^{(1)}$$

\* Rank 1 tensor. \* Rank 2 tensor (s).

$$\begin{bmatrix} M_{xx} & 0 & 0 \\ 0 & M_{xx} & 0 \\ 0 & 0 & M_{xx} \end{bmatrix}$$

$$M_{xx} = M_s^{(1)}$$

\* Rank 2 tensor (a). \* Rank 3 tensor (s). \* Rank 3 tensor (a). \* Rank 4 tensor (sss).

$$\begin{bmatrix} M_{xxxx} & M_{xxyy} & M_{xxyy} & 0 & 0 & 0 \\ M_{xxyy} & M_{xxxx} & M_{xxyy} & 0 & 0 & 0 \\ M_{xxyy} & M_{xxyy} & M_{xxxx} & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzyz} \end{bmatrix}$$

$$M_{xxxx} = 2M_g^{(1)} + M_s^{(1)} + 2M_s^{(2)}$$

$$M_{xxyy} = -M_g^{(1)} + M_s^{(1)}$$

$$M_{yzyz} = -M_g^{(1)} + M_s^{(2)}$$

\* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & M_{xxyy} & -M_{xxyy} & 0 & 0 & 0 \\ -M_{xxyy} & 0 & M_{xxyy} & 0 & 0 & 0 \\ M_{xxyy} & -M_{xxyy} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxyy} = 4T_{f3}^{(1)}$$

\* Rank 4 tensor (aas).

$$\begin{bmatrix} M_{yzyz} & 0 & 0 \\ 0 & M_{yzyz} & 0 \\ 0 & 0 & M_{yzyz} \end{bmatrix}$$

$$M_{yzyz} = M_s^{(3)}$$

\* Rank 4 tensor (aaa). \* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ M_{yzyz} & 0 & 0 \\ 0 & M_{yzyz} & 0 \\ 0 & 0 & M_{yzyz} \end{bmatrix}$$

$$M_{yzyz} = T_{f3}^{(2)}$$

\* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & M_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzyz} \end{bmatrix}$$

$$M_{yzyz} = T_{f3}^{(3)}$$

\* Rank 4 tensor (s).

$$\begin{bmatrix} M_{xxxx} & M_{xxyy} & M_{xxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ M_{xxzz} & M_{xxxx} & M_{xxyy} & 0 & 0 & 0 & 0 & 0 & 0 \\ M_{xxyy} & M_{xxzz} & M_{xxxx} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} \end{bmatrix}$$

$$M_{xxxx} = 2M_g^{(1)} + M_s^{(1)} + 2M_s^{(2)}$$

$$M_{xxyy} = -M_g^{(1)} + M_s^{(1)} + 4T_{f3}^{(1)}$$

$$M_{xxzz} = -M_g^{(1)} + M_s^{(1)} - 4T_{f3}^{(1)}$$

$$M_{yzyz} = -M_g^{(1)} + M_s^{(2)} + T_{f3}^{(2)}$$

$$M_{yzyy} = -M_g^{(1)} + M_s^{(2)} - T_{f3}^{(2)}$$

\* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzyz} & 0 & 0 & M_{yzyy} \end{bmatrix}$$

$$M_{yzyz} = M_s^{(3)} + T_{f3}^{(3)}$$

$$M_{yzyy} = -M_s^{(3)} + T_{f3}^{(3)}$$

\* Rank 4 tensor (t).

$$\begin{bmatrix} M_{xxxx} & 0 & 0 \\ 0 & M_{xxxx} & 0 \\ 0 & 0 & M_{xxxx} \\ 0 & 0 & M_{yyzz} \\ M_{yyzz} & 0 & 0 \\ 0 & M_{yyzz} & 0 \\ 0 & M_{yyzz} & 0 \\ 0 & 0 & M_{yyzz} \\ M_{yyzz} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxxx} = 2M_g^{(1)} + 3M_s^{(1)}$$

$$M_{yyzz} = -M_g^{(1)} + M_s^{(1)}$$