

Cubic ($432, \bar{4}3m, m\bar{3}m$), 011

$$H_{123} \rightarrow H_1$$

$$H_{125} \rightarrow H_2$$

$$H_{123} = \Delta H + 3H_{125}$$

$$\Delta H = H_{123} - 3H_{125} \quad H_{125} = \frac{H_{123} - \Delta H}{3}$$

$$\begin{aligned} \phi_{M_L, M_L^3} &= \frac{1}{2} B_{sp} \left[(1 - \cos 2\alpha) [\mp 2\Delta H \pm H_1 \mp 3H_2] \right. \\ &\quad \left. + \frac{1}{4} \left(-2\cos 2\alpha + \frac{\cos 4\alpha}{2} + \frac{3}{2} \right) [\pm 6\Delta H \mp 3H_1 \pm 9H_2] \right. \\ &\quad \left. \pm H_1 \pm 3H_2 \pm 2K_1 \right] \\ &= \frac{1}{2} B_{sp} \left[\mp \Delta H (1 - \cos 2\alpha) \right. \\ &\quad \left. \pm \frac{1}{4} 3\Delta H \left(-2\cos 2\alpha + \frac{\cos 4\alpha}{2} + \frac{3}{2} \right) \right. \\ &\quad \left. \pm H_1 \pm 3H_2 \pm 2K_1 \right] \\ &= \frac{1}{2} B_{sp} \left[\mp \frac{1}{8} \Delta H (4\cos 2\alpha - 3\cos 4\alpha - 1) \right. \\ &\quad \left. \pm H_1 \pm 3H_2 \pm 2K_1 \right] \end{aligned}$$

$$\begin{aligned} \phi_{M_T^3} &= \frac{1}{16} B_{sp} \left[(\sin 2\alpha + \sin 4\alpha) (\mp 6\Delta H \pm 3H_1 \mp 9H_2) + \right. \\ &\quad \left. \sin 2\alpha (\pm 2\Delta H \mp H_1 \pm 3H_2) \right] \\ &= \frac{1}{16} B_{sp} \left[\mp 3\Delta H (\sin 2\alpha + \sin 4\alpha) \right. \\ &\quad \left. \pm \Delta H \sin 2\alpha \right] \\ &= \frac{1}{16} B_{sp} \left[\mp \Delta H (2\sin 2\alpha + 3\sin 4\alpha) \right] \end{aligned}$$