

## I. $k \cdot p$ HAMILTONIAN

### A. Hamiltonian

$$H_{11}^{kp} = a_1 + a_2 + c_1 (k_x^2 + k_y^2) + c_2 (k_x^2 + k_y^2) + c_4 k_z^2 + c_5 k_z^2 \quad (1)$$

$$H_{12}^{kp} = c_3 \left( \left( 1 - \frac{\sqrt{3}i}{3} \right) k_x k_z + \left( -\frac{\sqrt{3}}{3} - i \right) k_y k_z \right) \quad (2)$$

$$H_{22}^{kp} = a_1 - a_2 + c_1 (k_x^2 + k_y^2) + c_2 (-k_x^2 - k_y^2) + c_4 k_z^2 - c_5 k_z^2 \quad (3)$$

### B. Parameters

$a_1 = -1.9225$ ;  
 $a_2 = -0.1072$ ;  
 $c_1 = -3.8327$ ;  
 $c_2 = 0.5985$ ;  
 $c_3 = -0.0525$ ;  
 $c_4 = 0.8931$ ;  
 $c_5 = 0.0188$ ;

## II. ZEEMAN'S COUPLING

### A. Hamiltonian

$$H_{11}^Z / (\mu_B / 2) = g_2 B_z + g_3 B_z \quad (4)$$

$$H_{12}^Z / (\mu_B / 2) = g_1 \left( \left( 1 - \frac{\sqrt{3}i}{3} \right) B_x + \left( -\frac{\sqrt{3}}{3} - i \right) B_y \right) \quad (5)$$

$$H_{22}^Z / (\mu_B / 2) = g_2 B_z - g_3 B_z \quad (6)$$

### B. Parameters

$g_1 = -1.9336$ ;  
 $g_2 = -6.829$ ;  
 $g_3 = 2.3372$ ;