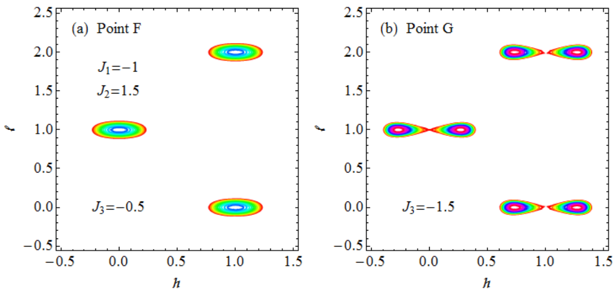

FIG. 12: (Color online) Distribution of Bragg peaks in the $(h, 0, l)$ reciprocal lattice plane. $J_1 = -1$. $J_2 = 1.5$, and J_3 is changed as a parameter. (a) F ($J_3 = -0.5$) and (b) G ($J_3 = -1.5$).

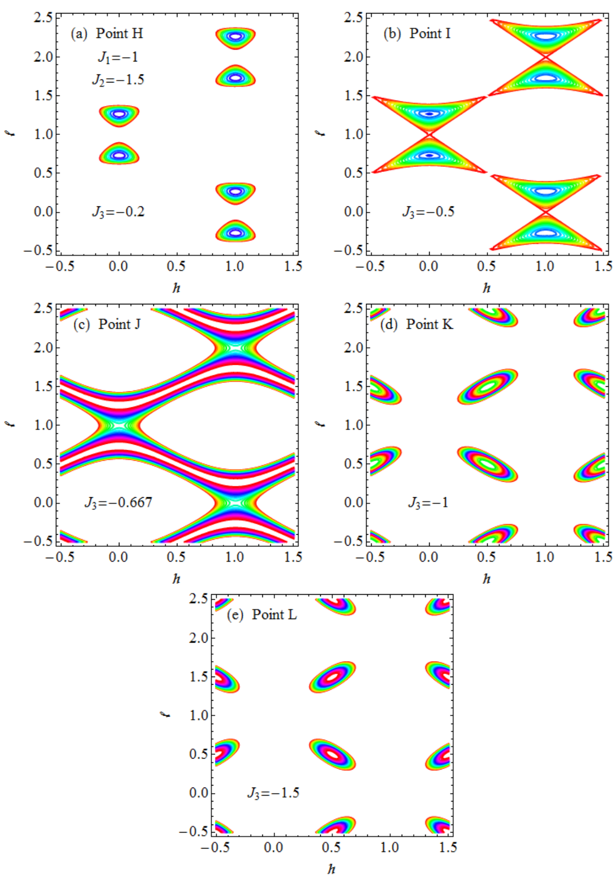

FIG. 13: (Color online) Distribution of Bragg peaks in the $(h, 0, l)$ reciprocal lattice plane. $J_1 = -1$. $J_2 = -1.5$, and J_3 is changed as a parameter. (a) H ($J_3 = -0.2$), (b) I ($J_3 = -0.5$), (c) J ($J_3 = -0.667$), (d) K ($J_3 = -1.2$), and (e) L ($J_3 = -1.5$).

C. The points H, I, J, K, and L with $J_1 = -1.0$ and $J_2 = -1.5$

Typical contour plot of $(h, 0, l)$ at the points H, I, J, K, and K in the (J_2, J_3) phase diagram are shown in Fig. 13. The point H ($J_3 = -0.2$) is in the helical phase along the c axis. The point I ($J_3 = -0.5$) is in the helical phase with the c axis and is on the line ($J_2 + J_3 = 2J_1$). The point J ($J_3 = -0.667$) is on the phase boundary between the helical phase with the c axis and the phase with ($h = 1.2, k = 0, l = 1/2$). The points K ($J_3 = -1.2$) and L ($J_3 = -1.5$) are in the phase with ($h = 1/2, k = 0, l = 1/2$).

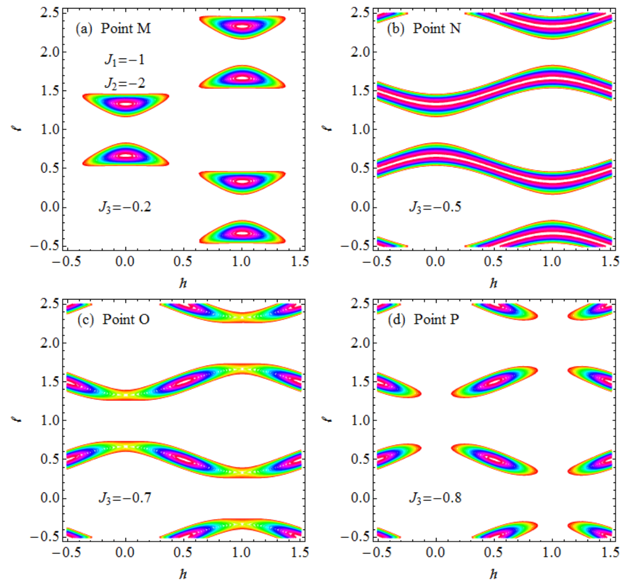

FIG. 14: (Color online) Distribution of Bragg peaks in the $(h, 0, l)$ reciprocal lattice plane. $J_1 = -1$. $J_2 = -2$, and J_3 is changed as a parameter. (a) M ($J_3 = -0.2$), (b) N ($J_3 = -0.5$), (c) O ($J_3 = -0.7$), and (d) P ($J_3 = -0.8$).

D. The points M, N, O, and P with $J_1 = -1.0$ and $J_2 = -2$

Typical contour plot of $(h, 0, l)$ at the points M, N, O, and P in the (J_2, J_3) phase diagram are shown in Fig. 14 The point M ($J_3 = -0.2$) is in the helical phase along the c axis. The point N ($J_3 = -0.5$) is on the phase boundary ($J_2 + J_3 = 2J_1$) between the helical phase with the c axis and the phase with ($h = 1.2, k = 0, l = 1/2$). The points O ($J_3 = -0.7$) and P ($J_3 = -0.8$) are in the phase with ($h = 1/2, k = 0, l = 1/2$).

IX. 3D SPIN STRUCTURES

What is the three dimensional (3D) spin structure which is characterized with the wavevector of the magnetic Bragg peaks? The vector of spin at the site $\mathbf{R}_i$ of the real lattice space is given by

$$\mathbf{S}_i = S[\cos(\mathbf{Q}\cdot\mathbf{R}_i)\mathbf{e}_x + \sin(\mathbf{Q}\cdot\mathbf{R}_i\phi)\mathbf{e}_y]$$

where $S = 3/2$, we assume that the phase factor ϕ is equal to zero, and $\mathbf{Q}$ is defined as

$$\mathbf{Q} = (ha^*, ka^*, lc^*).$$