

Abstract Submitted  
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**Non-Collinear Magnetic Orderings in Mott Insulators** ALEXANDER BAZHAN<sup>1</sup>, P.L. Kapitza Institute for Physical Problems, RAS, — Non-collinear magnetic orderings of four Cu magnetic moments in Mott insulators  $Rd_2CuO_4$  ( $R = Nd, Pr$ ) of  $I4/mmm$  symmetry and associated magnetic phase transitions are of interest in studies of transformations, when correlated electron-hole carriers are introduced in  $R_{2-x}Ce_xCuO_{4\pm\delta}$ . Orderings are determined by thermodynamic potential in representation by antiferromagnetic  $\mathbf{l}_1$ ,  $\mathbf{l}_2$  and magnetic  $\mathbf{m}$  vectors, with orderings of  $\mathbf{l}_1$ ,  $\mathbf{l}_2$  vectors along  $[100]$ ,  $[010]$  axis, with values  $l_1^2 = l_2^2 = 1/2 l_0^2$ ,  $[1]$ , which can be presented as,  $\Phi = 1/2 A (l_1^2 + l_2^2) + 1/2 A_3 l_3^2 + 1/2 B \mathbf{m}^2 + 1/2 D [(l_1 \mathbf{m})^2 + (l_2 \mathbf{m})^2] + 1/2 D_3 (l_3 \mathbf{m})^2 + 1/4 I (l_1^2 + l_2^2)^2 + 1/4 I_3 l_3^2 + 1/4 E (l_1^2 - l_2^2)^2 + 1/4 a (l_{1z}^2 + l_{2z}^2) + 1/4 a l_{3z}^2 - 1/4 b_2 [ (l_{1y}^2 + l_{2x}^2) - (l_{1x}^2 + l_{2y}^2) ] - 1/4 b_4 [ (l_{1y}^2 + l_{2x}^2)^2 + (l_{1x}^2 + l_{2y}^2)^2 ] - \mathbf{mH}$  where  $l_3 = 0$ . Magnetic phase transitions, are concerned with change of  $\mathbf{l}_1$ ,  $\mathbf{l}_2$  values in fields  $\sim H_{c1}$ ,  $\sim H_c$ , where  $l_1^2 = 0$ ,  $l_2^2 = l_0^2$ , when field is oriented along  $[100]$ ,  $[110]$  axis respectively, and next  $\mathbf{l}_2$  rotation to orthogonal to field direction in fields  $\sim H_{c2}$ , when field is along  $[110]$  axis. Fields  $H_{c1}$ ,  $H_c$ ,  $H_{c2}$  are presented as,  $H_{c1}^2 = 2BE l_0^4$ ;  $H_c^2 = H_{c1} H_{c2}$ , if  $H_{c2}^2 = b_2 B l_0^2$ ;  $H_c^2 = \sqrt{2} \cdot H_{c1} H_{c2}$  if  $H_{c2}^2 = b_4 B l_0^4$ . Formation of charge density waves of checkerboard structure can be detected by studies of transformation of magnetic phase transitions and fields in  $R_{2-x}Ce_xCuO_{4\pm\delta}$ . [1]. A. N. Bazhan, AIP Proceedings 850 (2006) 1241

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