Chirality domain walls in frustrated spin system

P. Rusek[1]

[1] *Wroclaw University of Technology, Wroclaw,PL*

In noncollinear spin system, states have additional quantum number - the chirality: spins can rotate clock- or counter-clock-wise on plaquette. The relevant order parameter of frustrated spins is rotation matrix $O\varepsilon SO(3)$. In this case space of available states is disconnected $\Pi_1(SO(3)) = Z_2$ and consequently linear topological defects - Z_2 vortices can be spontaneously excited in a system. If a chirality distribution in long distance from the vortex is uniform (by inclusion the spin orbit interaction) the Z_2 vortex generates the singular planar defect that is terminated on the vortex- the chirality domain wall(ChDW). In the ChDW the chirality changes its sign. We argue that ChDW has peculiar topology: in ChDW one can go from the ground state with the given chirality to the ground state with the opposite one *continueosly*, encircling Z_2 vortex. We claim that this feature of ChDW topology gives rice to spontaneuos creation of holes which edge is(closed) Z_2 vortex. Thus ChDW can colapse to Z_2 vortex and the barrier energy that stabalized ChDW is equal to nucleation energy of Z_2 loops with diameter of order of thickness of ChDW. This, in turn, is equal to the spin orbit length, i.e. the ChDW thickness as well as the energy barrier stabilizing ChDW are *not* macroscopically large. The application our ideas to the underdoped $La-$based cuprates in spiral phase is discussed.