

Density Waves Instability and a Skyrmion Lattice on the Surface of Strong Topological Insulators

Yuval Baum and Ady Stern

*Department of Condensed Matter Physics, Weizmann Institute of Science, Rehovot
76100, Israel*

The gapless surface states of strong topological insulators have drawn a great deal of attention over the past few years. In a previous work [1] it was shown that for a strong enough electron-electron interaction the surface of a strong topological insulator is unstable to the formation of spontaneous uniform magnetization.

In this work [2] we analyzed the instability conditions for spin-density-waves (SDW) formation on the surface of strong topological insulators. We find that for a certain range of energies the SDW instability is favored compared to the uniform one. We also find that the SDW are of spiral nature and for a certain range of parameters a Skyrmion-lattice is formed on the surface. We show that this phase may have a non trivial Chern-number even in the absence of an external magnetic field. Finally, we claim that a network of one-dimensional chiral channels may be established on the surface of a strong topological insulator.

[1] Y. Baum and A. Stern, Phys. Rev. B **85**, 121105(R)(2012).

[2] Y. Baum and A. Stern, Phys. Rev. B **86**, 195116 (2012).