凝縮系物理学ゼミナール
Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)
Time and date: 13:30 – 15:00, Wednesday, 28 January 2015

Chiral Anomaly in Weyl Semimetal with Topological Defect

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Abstract:

Weyl semimetals are materials which are characterized by one or more pairs of Weyl cones protected by topological numbers. Recently, many efforts are devoted to investigate their physical properties associated with chiral anomaly, which is originally the concept of high-energy physics and is considered to lead to exotic transport phenomena, for instance, anomalous Hall effect, chiral magnetic effect, and negative magnetoresistance [1]. On the other hand, thanks to recent developments in microengineering, many both experimental and theoretical researches on the effect of "lattice strain" on the electronic property of other topological materials such as graphemes and topological crystalline insulators, are conducted and reveal rich behaviors of these systems [2,3].

In this seminar I will discuss a type of chiral anomaly induced by strain. The study was performed with both the Cartan formalism, which describes curved spacetime with torsions, and numerical diagonalization method of tight-binding models. We obtained (quasi-)localized modes along a dislocation line. I will also discuss their physical consequence and symmetry protecting them.

Reference:

[1] P. Hosur and X. Qi, C. R. Physique **14**, 857 (2013).
[2] N. Levy *et al.*, Science **329**, 544 (2010).
[3] E. Tang and L. Fu, Nat. Phys. **10**, 964 (2014).