Title: Spin 3/2 topological phases in antiperovskite materials

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Abstract:

In antiperovskite materials A3BX with A=(Ca, Sr, La), B=(Pb, Sn) and X=(C, N, O) [1-3], electrons behave as effective spin-3/2 particles due to mixture of spin and orbital angular momenta through the spin-orbit coupling. In addition, owing to their band inversion these materials become topological crystalline insulators. Moreover, the superconducting transition in an antiperovskite Sr3-xSnO was experimentally observed recently [3].

Motivated by this experiment, we theoretically investigate general properties of the spin 3/2 topological insulators and their superconductivity [4]. In this talk, we are going to demonstrate that the spin-3/2 electrons provide rich topological phases in normal and superconducting states. We will also show that the odd-parity superconductivity of spin 3/2 electrons is unique topological state with higher winding number.

References:

[1] T. Kariyado and M. Ogata, J. Phys. Soc. Jpn 80, 083704 (2011).

[2] T. H. Hsieh, J. Liu, and L. Fu, Phys. Rev. B 90, 081112 (2014).

[3] M. Oudah, et al, Nat. Commun. 7, 13617 (2016).

[4] T. Kawakami, T. Okamura, S. Kobayashi, and M. Sato, Phys. Rev. X 8, 041026 (2018).