

Magnetic Weyl and Dirac Kondo Semimetals in Heterostructures

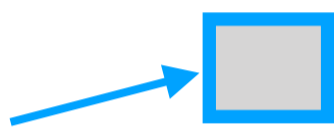
Research group of Titus Neupert, arXiv:1703.03804

Topologically-protected states

Topologically-protected states are those invariant to small perturbations. They are protected by symmetries of the material bulk and characterized by a topological invariant of the bulk.

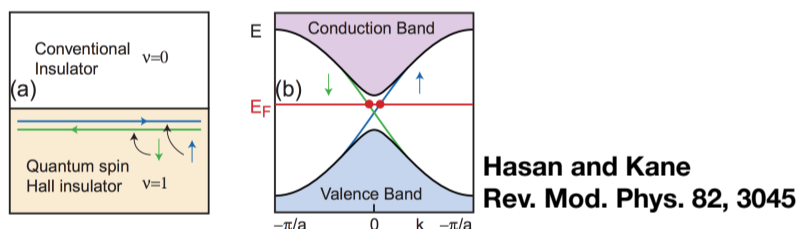
Topological insulators

Topological insulators are phases of matter, which are insulating in their bulk but possess metallic surface states that are topologically-protected by time-reversal symmetry.



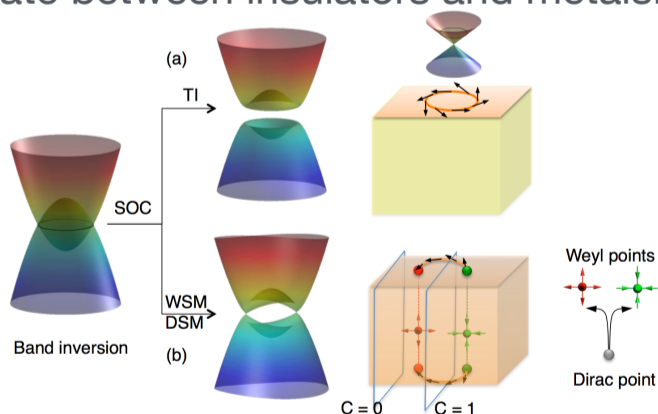
The 1D metal at the boundary of this 2D TI is, for instance, unaffected by non-magnetic disorder at the surface

Understanding topological insulator through band structure:

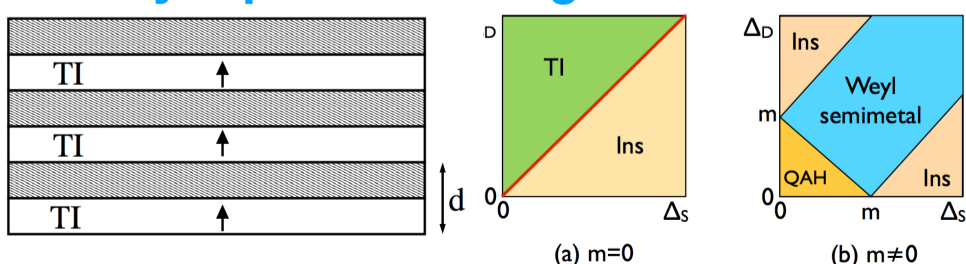


Topological semimetals

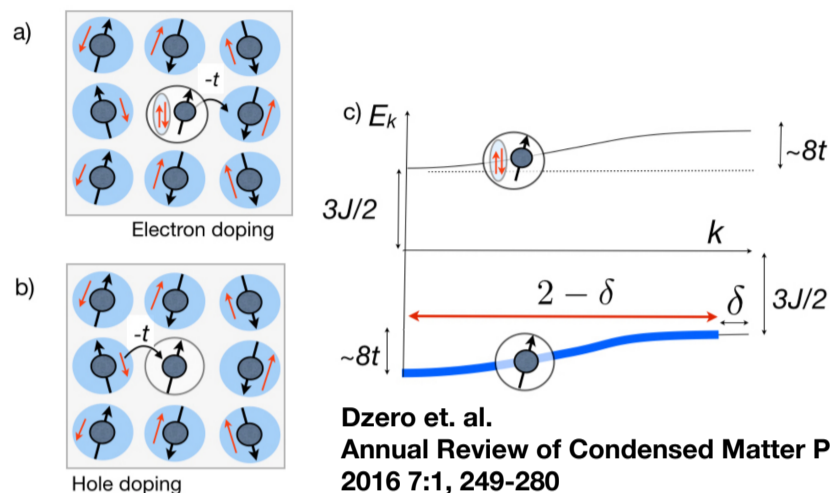
Topological semimetals are phases of matter intermediate between insulators and metals.



Semimetal from a topological insulator multilayer plus ferromagnetic order:



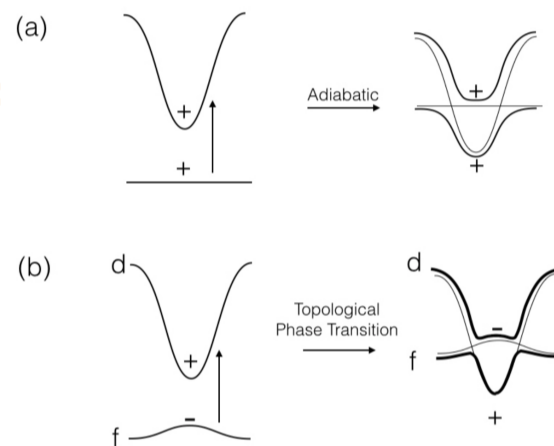
Kondo insulator



Topological Kondo insulator

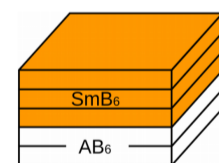
Connection to topological insulator:

In the simplest case, the topological Kondo insulator is the same as the topological insulator EXCEPT that the topological phase is protected by electron-electron correlations.

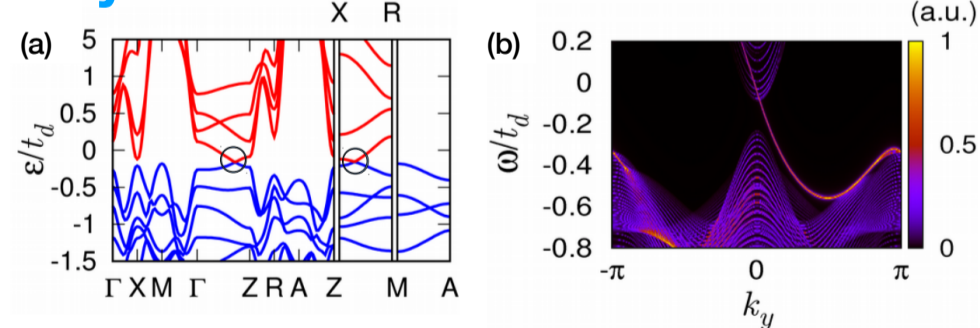


Topological Kondo semimetal from heterostructure:

We can similarly construct topological Kondo semimetals from the topological Kondo insulator



Weyl Kondo semimetal



Dirac Kondo semimetal

