Classification of 3D Kitaev spin liquids

M. Hermanns

University of Cologne

The Kitaev honeycomb model has become one of the archetypal spin models exhibiting topological phases of matter, where the magnetic moments fractionalize into Majorana fermions interacting with a Z_2 gauge field. In this talk, I discuss generalizations of this model to three-dimensional crystal structures; in particular, what types of metallic states the emergent Majorana fermions can form, and how these Majorana metals depend on the details of the underlying lattice structure. Besides (almost) conventional metals with a Majorana Fermi surface, one also finds various realizations of Dirac semimetals, where the gapless modes form Fermi lines or even Weyl nodes. I also discuss how this zoo of gapless quantum spin liquid phases can be comprehensively classified using a projective symmetry analysis.