CENTRE
DE RECHERCHES
MATHÉMATIQUES

Théorie conforme des champs et systèmes quantiques à plusieurs corps
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Conformal field theory and quantum many-body physics
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Fractionalized fermionic quantum criticality

In frustrated magnets, novel phases characterized by fractionalized excitations and emergent gauge fields can occur. A paradigmatic example is given by the Kitaev model of localized spins 1/2 on the honeycomb lattice, which realizes an exactly solvable quantum spin liquid ground state with Majorana fermions as low-energy excitations. I will demonstrate that the Kitaev solution can be generalized to systems with spin and orbital degrees of freedom. The phase diagrams of these Kitaev-Kugel-Khomskii spin-orbital magnets feature a variety of novel phases, including different types of quantum liquids, as well as conventional and unconventional long-range-ordered phases, and interesting phase transitions in between. In particular, I will discuss the example of a continuous quantum phase transition between a Kitaev spin-orbital liquid and a symmetry-broken phase. This transition can be understood as a realization of a fractionalized fermionic quantum critical point.