

Abstract – Spin liquids

In spin systems, where magnetic frustration is present, there are two different states that are distinguished in the following. In the case of valence bond crystal states (VBC) even though frustration is present, the spins arrange themselves in dimers of valence bond (VB) couplings with a long range order (LRO) in the ground state. A VB is the coupling between two spins to singlet states, which allow them to minimise the energy between them. In a second case the geometry of the system does not allow such a regular ordered configuration and even in the ground state no LRO in the VB dimers is present. In such a resonating valence bond state (RVB) fractional excitations are possible in contrary to the VBC, where free moving spins (spinons) are not realizable. This gives the definition of a spin liquid. As the system is composed of building blocks consisting of paired spins, it is not possible to create a single spinon. This leads to the consequence that the degeneracy of the ground state depends on the topology of the system. This is a feature of topological order. Vortices in the field that connects the two spinons are called visons.