Author: L. Messio

Title: **Projective symmetry group approach of chiral phases**

Quantum spin liquids are generally opposed to classical Néel states. In the Schwinger boson mean-field theory (SBMFT), S is a continuous parameter and in that framework one can study connections between spin liquids and Néel states. Mean-field Ansätze respecting the lattice symmetries can be selected using projective symmetry groups (PSG) (Wen, PRB 2002 and Wang et al., PRB 2006). They lead to phases which can either be spin liquids if the gap is non zero (small S), or magnetized states (large S) with Goldstone modes. These Ansätze are labelled by gauge invariant quantities called fluxes. We present an adaptation of the PSG approach to the classical spin limit and apply it to triangular and kagome lattices. This helps us in sorting spin rotational symmetry breaking states. We show that well known chiral classical states are excluded in the orignal approach of Wen and Wang. But by relaxing constraints, we are able to display three dimensional chiral Néel states wich under the effects of quantum fluctutions transpose in chiral spin liquids, breaking the time reversal symmetry. We propose models where these states could be ground state.