MAR12-2011-001126

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Confinement transitions of Z2 spin liquids on the kagome lattice[1]

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Motivated by numerical evidence of a Z2 spin liquid ground state of the Heisenberg model on the kagome lattice and indications of a proximate valence bond solid (VBS) phase (see S. Yan et al, Science 332, 1173 (2011)), we study quantum phase transitions between Z2 spin liquids and VBS states, in which the space group of the kagome lattice is broken. These confinement transitions are driven by the condensation of elementary vortex excitations of the Z2 spin liquid, so called visons. In this talk I will show how a projective symmetry group (PSG) analysis of effective models for the visons can be used to construct quantum field theories for such confinement transitions, which in turn allow for a classification of the spatial symmetries of possible VBS states. Interestingly, the kagome lattice is unique in the sense that the critical properties at the confinement transition are seemingly not described by the Wilson-Fisher fixed point, as is the case for other lattice geometries.

[1]Support by the National Science Foundation (DMR-0757145), AFOSR as well as the Austrian Science Fund (J3077-N16) is gratefully acknowledged.