Spin liquid and order in quantum ice

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The geometrical frustration in spin ice leads to a highly degenerate classical ground state manifold supporting monopole excitations. Here we discuss some of the new phenomena which result from quantum tunneling between spin ice configurations. Using Monte Carlo simulation methods we investigate the stability of the quantum liquid phase against ordered "chain states" in a realistic model of spin ice including long-range dipolar interactions. We also explore an effective model of spin ice with short range exchange interactions by examining the nature of spin ordered states in an external magnetic field and their competition with the quantum liquid phase.

References:

[1] P. McClarty, O. Sikora *et al.*, Phys. Rev. B **92**, 094418 (2015)