Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Transition from the Z2 spin liquid to antiferromagnetic order: spectrum on the torus SETH WHITSITT, SUBIR SACHDEV, Harvard Univ — We study the finite-size spectrum of the quantum critical point between a Z_2 spin liquid and a coplanar antiferromagnet on the torus. Due to the existence of non-trivial order on either side of this transition, this critical point cannot be described in a conventional Landau-Ginzburg framework. Instead it is described by a theory involving fractionalized degrees of freedom known as the $O(4)^*$ model, whose spectrum is altered in a significant way by its proximity to a topologically ordered phase. We compute the spectrum by relating it to the spectrum of the $O(4)$ Wilson-Fisher fixed point on the torus, along with a selection rule on the states, and with non-trivial boundary conditions corresponding to topological sectors in the spin liquid. The spectrum of the Wilson-Fisher fixed points is then calculated directly from the ϵ- and large-N expansions, which allows a reconstruction of the full spectrum of the $O(4)^*$ model. This spectrum is a unique characteristic of a fractionalized quantum critical point as well as a universal signature of the existence of a proximate Z_2 topological phase which can be compared with numerical computations.

Seth Whitsitt
Harvard Univ

Date submitted: 06 Nov 2015 Electronic form version 1.4