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On Fractionalized Quantum Criticality in Two Dimensional $O(3)$ Antiferromagnets DAVID SANTIAGO, ZAIRA NAZARIO, Stanford University — We consider a recently propose field theory which inculdes magnetizationa and gapped skyrmion and antiskyrmion excitations in 2 +1 dimensional antiferromagnets. The skyrmions and antiskyrmions as spin 1/2 objects, i.e. spinons.From this field theory we show how the spinon fluctuations change the renormalization of the coupling constant, thus changing the critical coupling at which Nèel order is lost. We also show that spinon fluctuations will lead to corrections to critical exponents as they renormalize the magnetization propagators beyond the usual renormalizations due to order parameter fluctuations. Since the spinon gap is inversely proportional to the coupling constant, and the renormalized inverse coupling constant, or spin stiffness, vanishes at the quantum critical point, the onset of paramagnetism is identified with spinon gap collapse. Because of this we conclude that essentially free skyrmions and antiskyrmions are the low energy degrees of freedom intrinsic to the quantum critical point as there are no Goldstone eigenstates at criticality due to lack of Nèel order.

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