Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Decoherence in a Dynamical Quantum Phase Transition SARAH MOSTAME, Harvard University, GERNOT SCHALLER, TU Berlin, RALF SCHUETZHOLD, University of Duisburg-Essen — Motivated by the similarity between adiabatic quantum algorithms and quantum phase transitions, we study the impact of decoherence on the sweep through a second-order quantum phase transition for the prototypical example of the Ising chain in a transverse field. For site-independent and site-dependent coupling strengths as well as different operator couplings, the results show that (in contrast to first-order transitions) the impact of decoherence caused by a weak coupling to a rather general environment increases with system size which might limit the scalability of the corresponding adiabatic quantum algorithm. We also propose a physical setup that can be used to simulate the quantum dynamics of the Ising model.

Sarah Mostame
Harvard University

Date submitted: 18 Nov 2010 Electronic form version 1.4