

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**Emerging Modified Transverse-Field Ising Model On A Hydrogenated Silicon Surface**<sup>1</sup> BURKHARD RITTER, KEVIN BEACH, University of Alberta — Advances in the precise placement of dangling bonds on a hydrogenated silicon surface open the prospect of manufacturing large scale quantum dot arrays. Small clusters of specifically arranged quantum dots comprise a system of bistable, interacting cells. Starting from an extended Hubbard model and using a set of controlled Hilbert space truncations, we show that such a system of quantum dot cells can be mapped to a modified transverse-field Ising model with long-ranged interactions. Each cell is described by a pseudo-spin. Because we control cell orientation and placement, we can construct a wide range of structures, with ferromagnetic and antiferromagnetic chains as simple examples. The Ising-like model is amenable to stochastic series expansion Monte Carlo, allowing the simulation and characterization of large systems.

<sup>1</sup>Work supported by Alberta Innovates Technology Futures

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Date submitted: 15 Nov 2013

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