

# Center for Quantum Science and Engineering (CQSE)

Weekly Seminar  
Oct. 15, 2010 (Friday)

TIME Oct. 15, 14:30 ~ 15:30  
TITLE Looking for Structural Glass Physics Using One-dimensional Spin Glass Models  
SPEAKER Dr. Derek Larson  
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PLACE Rm716, CCMS & New Physics Building, NTU

## Abstract

The study of structural glasses remains a difficult problem in condensed matter physics. In order to attack this problem from another angle, one can attempt to find models from other areas that capture the important physics while remaining simple enough to explore in depth. A natural choice is to hunt for a spin glass model that fits this description, and I will discuss two such candidates: a "3-spin" spin glass and a 10-state Potts glass. Their connection to structural glasses comes from Mode Coupling Theory and the mean field solution called One-Step Replica Symmetry Breaking. Ultimately we want a model that maintains this connection out of the mean field, in finite dimensions. Thus, I show how the phase structure depends on the effective system dimension. We use one-dimensional models with tunable long-range interactions, simulated with parallel tempering Monte Carlo. By changing the parameter that controls the range of the interactions, we can continuously alter the effective dimension. We find that the mean-field-type critical behavior of the 10-state Potts glass extends into lower dimension than that of the 3-spin model, and may prove a useful tool for understanding structural glasses.

