

Spin glasses and Adiabatic Quantum Computing

A. P. Young

University of California Santa Cruz

In this talk I will discuss various aspects of spin glass physics which are relevant for Adiabatic Quantum Computing. These include the phase transition which occurs on lowering the temperature in classical spin glasses, and on lowering the transverse field at zero temperature in quantum spin glasses. An unusual feature of classical spin glasses is that a line of transitions, the de Almeida-Thouless (AT) line, occurs in a magnetic field at least in mean field theory. The question of whether a quantum AT line can occur at zero temperature will be raised. A particular emphasis on the talk will be on chaos in spin glasses, which can be due to a change in temperature (T-chaos), or a change in interactions (J-chaos), or, in the quantum case, a change in the transverse-field (TF-chaos). The difficulties caused by chaos in spin glasses when solving problems by Adiabatic Quantum Computing will be discussed. It will also be pointed out that more work needs to be done to see to what extent there is a correlation between these different types of chaos among different problem instances.