Title: Stochastic Cellular Automata Annealing (SCA) and its Non-Quantum Silicon Chip Implementation: Realizing Fully-Parallel Spin-Updates for Fully-Connected Spin Systems

Author: Masato Motomura and Kazushi Kawamura

Abstract:

Stochastic cellular automata annealing (SCA) and its room-temperature non-quantum digital silicon chip implementation are presented. As opposed to simulated annealing, SCA allows fully parallel spin updates of fully connected spins by re-visiting and re-modeling the fundamental spin update dynamics of simulated annealing. A 65nm CMOS prototype chip, called STATICA, contains 512 fully-connected spins (0.25M interactions) on-chip, updating all the spins in one cycle (320MHz, 649mW). It is shown that STATICA outperforms all the existing annealing solutions.