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Thermal Annealing of Classical Bits

We propose a new annealing method of obtaining the minimum energy states of Ising models. The idea is based on a classical analog of D-Wave quantum annealing machine in which quantum noise leads the system to the minimum energy state during the change in qubit potential from monostable to bistable states by reducing the transvers field. By controlling the potential of the classical analog, we should find a similar annealing process with thermal noise at higher temperature instead of the quantum noise. The hypothesis was examined by circuit simulation of networks of quantum flux parametrons (QFPs) at 4 K which are basically the same circuits as D-Wave machine. We successfully observed the annealing operations in small systems consisting of a few bits. Possible annealing at room temperature is also discussed on the basis of the natural extension of the concept to semiconductor circuits with bistable states such as SRAM and Schmitt trigger.