“Memcomputing: Leveraging Memory and Physics to Compute Efficiently”

Speaker:
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Abstract:
It is well known that physical phenomena may be of great help in computing some difficult problems efficiently. A typical example is prime factorization that may be solved in polynomial time by exploiting quantum entanglement on a quantum computer. There are, however, other types of (non-quantum) physical properties that one may leverage to compute efficiently a wide range of hard problems. In this talk, I will discuss how to employ one such property, memory (time non-locality), in a novel physics-based approach to computation: Memcomputing. As examples, I will show the efficient solution of prime factorization, the search version of the subset-sum problem, approximations to the Max-SAT, and the ground state of Ising spin glasses, using self-organizing logic gates, namely gates that self-organize to satisfy their logical proposition. I will also show that these machines take advantage of the long-range order that develops during their transient dynamics in order to tackle the above problems and are robust against noise and disorder. The digital memcomputing machines we propose can be efficiently simulated, are scalable, and can be easily realized with available nanotechnology components. Work supported in part by MemComputing, Inc. (www.memcpu.com) and CMRR.

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Hosted By:
Dr. Yuriy Pershin

Refreshments Served
Everyone Invited

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