Center for Magnetic Recording Research
SEMINAR

Tuesday, April 12, 2011

3:30 PM – Refreshments - CMRR Lobby

4:00 PM – Seminar - CMRR Auditorium

Memory Effects In Nanoscale Systems

Massimiliano Di Ventra

Professor

Department of Physics

University of California, San Diego

Host: Professor Eric E. Fullerton, ECE/CMRR

Memory emerges quite naturally in systems of nanoscale dimensions: the change of state of electrons and ions is not instantaneous if probed at specific time scales, and it generally depends on the past dynamics [1]. This means that the resistive, capacitive and/or inductive properties of these systems generally show interesting time-dependent (memory) features when subject to time-dependent perturbations. In other words, nanoscale systems behave as a combination of (or simply as) memristors, memcapacitors or meminductors, namely circuit elements whose resistance, capacitance and inductance, respectively, depends on the past states through which the system has evolved. After an introduction to the theory and properties of memristors, memcapacitors and meminductors, I will discuss several memory phenomena in nanostructures associated to charge, ion and spin dynamics and their far-reaching applications ranging from information storage to computation to biologically-inspired systems. Work supported in part by NSF, NIH, and DOE.

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[1] Y.V. Pershin and M. Di Ventra, "Memory effects in complex materials and nanoscale systems", Adv. Phys. 60, 145 (2011).

BIO: *Massimiliano Di Ventra* graduated in Physics from the Ecole Polytechnique Federale de Lausanne in 1997. He is now Professor of Physics at the University of California, San Diego. He is an expert is in the theory of electronic and transport properties of nanoscale systems, and has delivered more than 130 invited talks worldwide on these topics. He serves on the editorial board of several scientific journals and has won numerous awards and honors, including the NSF Early CAREER Award, the Ralph E. Powe Junior Faculty Enhancement Award, and fellowship in the Institute of Physics. He has co-edited the textbook *Introduction to Nanoscale Science and Technology* (Springer, 2004) for undergraduate students, and he is single author of the graduate-level textbook *Electrical Transport in Nanoscale Systems* (Cambridge University Press, 2008).

Please observe the "No Food or Drink in the Auditorium" policy.