



Yale Institute for Nanoscience
and Quantum Engineering

Friday- May 13, 2016

12:00 to 1:00 p.m.

BECTON SEMINAR ROOM

Light lunch will be served at 11:45 a.m.

Stuart S. P. Parkin

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IBM Research – Almaden, San Jose, California, USA

“Cognitive Devices Based on Ion Currents in Oxide Thin Films”

Conventional silicon based electronic computing devices use about one million times more energy to carry out a computing operation than does a mammalian brain. The devices, interconnections, and information processing paradigms in the latter are profoundly different from those used in today’s computers. Approaches to the development of extremely energy efficient computing will likely rely on devices that operate on entirely different principles, that are mutable, and which likely possess innately three dimensional structures and architectures. We discuss one possible approach that relies on the control of the conductivity of oxide thin films via tiny but reversible ionic currents of oxygen ions that are induced by very large electric fields at the interface with ionic liquids¹. Removal of sub atomic percent concentrations of oxygen from structures that have open channels for the ready migration of oxygen gives rise to giant structural distortions² and metallization of what were initially insulating layers. This may allow a path to innately mutable, cognitive switches.

Host: Professor Eric Altman