



## Lecture Abstract: The Spin on Electronics!

Recent advances in manipulating spin-polarized electron currents in atomically engineered magnetic heterostructures make possible entirely new classes of sensor, memory and logic devices - a research field generally referred to as spintronics<sup>1</sup>.

A magnetic recording read head, initially formed from a spin-valve, and more recently by a magnetic tunnel junction, has enabled a 1,000-fold increase in the storage capacity of hard disk drives since 1997. The very low cost of disk drives and the high performance and reliability of solid state memories, may be combined in the Racetrack Memory.

The Racetrack Memory is a novel three dimensional technology which stores information as a series of magnetic domain walls in nanowires, manipulated by spin polarized currents. Spintronic devices may even enable plastic devices that mimic synaptic switches in the brain.

**Dr. Stuart Parkin** is an IBM Fellow (IBM's highest technical honor), Manager of the Magneto-electronics group at the IBM Almaden Research Center, San Jose, CA and a Consulting professor in the Dept. of Applied Physics at Stanford University.

He is also director of the IBM-Stanford Spintronic Science and Applications Center. Dr. Parkin's research interests include organic superconductors, high-temperature superconductors, and, more recently magnetic thin film structures and spintronic materials and devices for advanced sensor, memory, and logic applications.

Parkin's discoveries in magneto-resistive thin film structures enable a 1000 fold increase in the storage capacity of magnetic disk drives in little more than a decade. Most recently, Parkin is working on a novel storage class memory device, "Racetrack Memory", which could replace both hard disk drives and many forms of conventional solid state memory.

Parkin is a Fellow of the Royal Society (London), the American Physical Society, the Materials Research Society, the Institute of Physics (London), the IEEE, and the AAAS. Parkin is also a Member of the National Academy of Sciences, the National Academy of Engineering and a Fellow of the American Academy of Arts and Sciences.

Parkin is the recipient of numerous awards and honors including, the American Physical Society International Prize for New Materials (1994), the Europhysics Prize for Outstanding Achievement in Solid State Physics (1997), and the 1999-2000 American Institute of Physics (AIP) Prize for Industrial Application of Physics.

Parkin has received Honorary Doctorates from the RWTH Aachen, Germany and the Eindhoven University of Science and Technology, The Netherlands, and has been appointed a Distinguished Visiting Professor at six universities in Europe, Singapore and Taiwan.

Most recently Parkin received the 2008 IEEE Daniel E. Noble Award for his work on MRAM, the 2008 IEEE Distinguished Lecturer Award, the 2009 IUPAP Magnetism Prize and Neel Medal for outstanding contributions to the science of magnetism, the 2008 Gutenberg Research Award and the 2009 Dresden Barkhausen Award. Parkin has authored ~370 papers and has ~82 issued patents.

## ANSTO Distinguished Lecture Series

**Date:** 11 am, 25 February, 2010

**Venue:** AINSE Theatre

Dr Stuart Parkin is an expert in the atomic engineering of memory and logic devices that have the potential to increase the power of computers and other electronic devices to another level.

His discoveries in magneto-resistive thin film structures have enabled a 1000 fold increase in the storage capacity of magnetic disk drives in little more than a decade. He is now working on a novel storage class memory device, 'Racetrack Memory', which could replace both hard disk drives and many forms of conventional solid state memory.

His talk, entitled **The Spin on Electronics!** is part of ANSTO's Distinguished Lecture Series and is scheduled for 45 minutes, to be followed by question time. Members of the general public are welcome.