

PHYSICS & ASTRONOMY COLLOQUIUM  
UNIVERSITY OF WISCONSIN – STEVENS POINT

FRIDAY, NOV 18, 2011  
2:00 PM Room A106 SCI

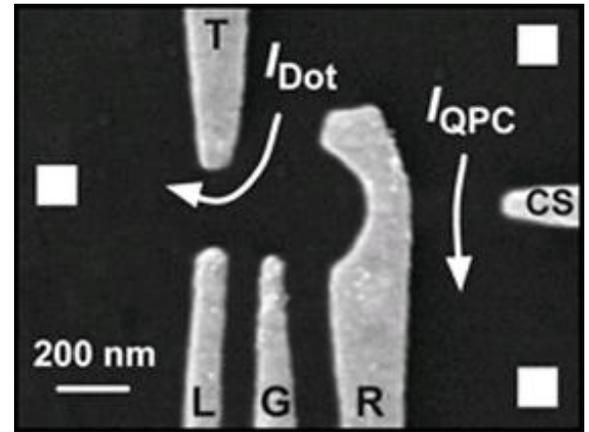
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Electron Spin Qubits in Si/SiGe Quantum Dots



Mark A. Eriksson is Professor in the Department of Physics at the University of Wisconsin-Madison. He received his Ph.D. from Harvard University in 1997 and was a postdoc at Bell Labs for two years from 1997-1999. His research interests are in the areas of silicon nanostructures, quantum computation, spins in semiconductors, nanomembranes, carbon nanotubes, and thermoelectric materials. Eriksson leads a University of Wisconsin-based team studying semiconductor-based quantum computing and focusing on the development of silicon quantum dot spin qubits.



**ABSTRACT:** It is intriguing that silicon, the central material of modern classical electronics, also has properties well suited to quantum electronics. Recent advances in Si/SiGe quantum devices have enabled the creation of high-quality silicon quantum dots, also known as artificial atoms. Motivated in part by the potential for very long spin coherence times in this material, we are pursuing the development of electron spin qubits in silicon quantum dots. I will discuss recent demonstrations of single-shot spin measurement in a Si/SiGe quantum dot spin qubit, and the demonstration of spin-relaxation times longer than one second in such a system. These and similar measurements depend on a knowledge of tunnel rates between quantum dots and nearby reservoirs or between pairs of quantum dots. Measurements of such rates provide an opportunity to revisit classic experiments in quantum mechanics. At the same time, the unique features of the silicon conduction band lead to novel and unexpected effects, demonstrating that Si/SiGe quantum dots provide a highly controlled experimental system in which to study ideas at the heart of quantum physics.

*Faculty, staff and students are cordially invited to attend.  
Refreshments will be served beginning at 1:45 pm*