Silicon Qubit Workshop
Monday, August 24, 2009 - Tuesday, August 25, 2009
Berkeley, CA

Day 1, Monday, August 24, 2009

7:30 - 7:45  Busses leave from the Double Tree Hotel to CITRIS, (Hearst Ave. at Leroy Ave.)

8:15      Welcome and announcements

8:30      Si/SiGe Depletion-Mode and Accumulation-Mode Few-Electron dots,
          A. T. Hunter, (HRL Laboratories)

8:55      Modeling Accumulation-Mode Few-Electron Quantum Dots,
          R. S. Ross (HRL Laboratories)

9:20      Pulse-gate excited-state spectroscopy in a Si/SiGe quantum dot by charge sensing,
          M. Thalakulam (University of Wisconsin-Madison)

9:45      Physical mechanisms of interface-mediated intervalley coupling in Si,
          B. Koiller (Instituto de Física UFRJ)

10:10     Refreshments and discussions

10:40     Charge sensing and controllable tunnel coupling in a Si/SiGe double quantum dot,
          C. D. Simmons (University of Wisconsin-Madison)

11:05     Singlet-triplet qubits in multivalley Si quantum dots,
          D. Culcer (University of Maryland)

11:30     Electron spin coherence and manipulation in Si quantum dots,
          X. Hu (University at Buffalo, SUNY)

11:55     Lunch and break out meetings

1:00      Recent experiments to probe individual spins of a few-electron silicon quantum dot,
          H. W. Jiang (UCLA)

1:25      Pulsed electron spin resonance on silicon MOSFETs
          S. Shankar (Princeton)

1:50      Modeling Si Double Quantum Dot Qubits
          R. Muller (Sandia National Laboratory)

2:15      The impact of classical electronics constrains on a solid-state logical qubit memory,
          A. J. Landahl (Sandia National Laboratory)

2:40      Refreshments and discussions

3:10      Probing charge state degeneracy in silicon isolated double quantum dots by a SET,
          T. Ferrus (Hitachi Cambridge Laboratory)
3:35 Coulomb Blockade and Charge Sensing in Double Top Gated Si MOS Nano-Structure, E. P. Nordberg (Sandia National Laboratory)
4:00 Quantum Hall Charge Sensor for Single-Donor-Spin Detection in Silicon, N. Y. Kim (Stanford)
4:25 Cryogenic CMOS circuits for single charge digital readout, K. Eng (Sandia National Laboratory)
4:50 Compact modeling of cryogenic CMOS circuits using Verilog-A, A. Akturk (University of Maryland)

5:15 Busses depart to The Molecular Foundry at LBNL
5:30 Poster session and refreshments
7:45 - 8:00 Busses depart from the Molecular Foundry to the Double Tree Hotel

Day 2, Tuesday, August 25, 2009

7:30 - 7:45 Busses leave from the Double Tree Hotel to CITRIS, (Hearst Ave. at Leroy Ave.)
8:15 Welcome and announcements
8:30 Single-shot Electron Spin Readout of Individual Implanted Phosphorus Donors in Silicon, A. Morello (University of New South Wales)
8:55 Excited Triplet state of a dopant and valley-orbit coupling in a nano MosFet, S. Rogge (Delft University of Technology)
9:20 Million-Atom Electronic Structure Simulations for Realistically Large Si-Based Quantum Devices, G. Klimeck (Purdue University)
9:55 Refreshments and discussions
10:25 The importance of valley splitting in few-electron donor based quantum dots in silicon, M. Fuechsle (University of New South Wales)
10:50 Silicon donor devices and quantum computer architecture Considerations, L. C. L. Hollenberg (University of Melbourne)
11:15 Recent progress on transport through single phosphorus donors, M. Möttönen (University of New South Wales)
11:40 Silicon single electron devices for quantum information Processing, M. Sanquer (CEA-Grenoble)
12:05 Lunch and break out meetings
1:05 Methods for the Electrical Readout of Nuclear Spin States, M. S. Brandt (Technische Universität München)
1:30 Electrically detecting electronic and nuclear spins in silicon, D. R. McCamey (University of Utah)
1:55 Host silicon isotope effect on 31P ENDOR frequencies, K. M. Itoh (Keio University)
2:20 Spin-dependent scattering off Neutral Donors in Silicon Field-Effect Transistors, C. C. Lo (UC Berkeley / LBNL)
2:45 Optimal experiment design for parameter estimation as applied to dipole- and exchange-coupled qubits, K. Young (UC Berkeley)
3:10 Refreshments and discussions
3:40 Isotopically Engineered Silicon for Quantum Information Technology,  
J. W. Ager III (Lawrence Berkeley National Laboratory)
4:05 Solid State quantum memory using the nuclear spins in silicon,  
J. J. L. Morton (Oxford University)
4:30 Optical Transitions of the p Bound Exciton in Si for Reading and Hyperpolarizing the Donor Electron and  
Nuclear Spins  
M. Thewalt (Simon Fraser University)
4:55 Stark effect for Si:Li spin qubits  
L. Pendo (South Dakota School of Mines & Technology)
5:20 Single ion doping of spin readout transistors,  
C. D. Weis (Lawrence Berkeley National Laboratory)
5:45 Adjourn
6:00 Busses depart from CITRIS to the Double Tree Hotel
7:30 Optional ad hoc discussion groups at the Double Tree Hotel,  
e. g. on the role of defects in Donor and Quantum Dot Qubit Devices.

Wednesday, August 26, 2009

Berkeley Lab Tours

For those interested, we will be offering tours of some of the experimental facilities at LBNL.  
Signup sheets for the tours will be available on Tuesday.

8:45 Busses depart from The Double Tree Hotel and drive to LBNL for tours,  
drop off is at the Advanced Light Source (ALS)
9:05 Break up into groups for tours of the Single Ion Implant lab, the Heavy Ion Fusion lab, the high power laser lab  
(l'Oasis), the National Center for Electron Microscopy, The Molecular Foundry and the Advanced Light Source  
(ALS).
12:00 Lunch and break out meetings (no host)
1:30 Busses depart from the ALS to the Double Tree Hotel
Posters for Monday evening, 5:30 – 8:00, at The Molecular Foundry, LBNL

E. Bielejec, Sandia National Laboratory
Development of Self-Aligned Single Donor Implanted Lateral Double Quantum Dots

D. W. Drumm, University of Melbourne,
Density Functional Theory modeling of delta-doped phosphorus in silicon

M. Fuechsle, University of New South Wales,
Towards a single P donor in silicon

M. Grace, Sandia National Laboratory,
Protecting Quantum Information with Optimal Control, Sandia National Laboratory

J. He, Princeton University,
Electron Spin Resonance in Modulation Doped Si/SiGe Heterostructures with Large Area Gates

A. Hegyi, UC Berkeley,
Optimal coupling between an LC resonator and an electric or magnetic dipole qubit

C. D. Hill, University of Melbourne,
Quantum search with decoherence

B. Hu, University of Maryland,
Metal-oxide-semiconductor single-electron transistor in pure silicon

A. A. Kiselev, HRL Laboratories,
SiGe Quantum Dot Structures: Effects of Inter-Valley Mixing on Qubit Operation

T. Lehmann, University of New South Wales,
SOS Current Mirror Matching at 4K: a brief study

J. E. Levy, Sandia National Laboratory,
The impact of classical electronics constraints on a solid-state logical qubit memory

J. E. Levy, Sandia National Laboratory,
Classical Electronics Constraints on Solid-State Qubits

C. C. Lo, Lawrence Berkeley National Laboratory and UC Berkeley
Development and Characterization of FinFets for Donor Spin Qubit Readout

J. McCallum, University of Melbourne,
Electrical Characterization of MOS structures for silicon-based quantum computer device fabrication

M. Möttönen, University of New South Wales,
Probe and control of the reservoir density of states in single electron transistors

G. J. Podd, Hitachi Cambridge Laboratory,
Charge detection in intrinsic silicon quantum dots

W. Pok, University of New South Wales,
Precision control of tunneling in STM-patterned Si:P devices

R. Rahman, Sandia National Laboratory and Purdue University,
Coherent electron transport by adiabatic passage in a triple donor system with imperfect donor placement
P. Spizziri, University of Melbourne,
Raman spectroscopy of the Si:P System

K. Y. Tan, University of New South Wales,
Tunneling Spectroscopy of Individual Implanted Phosphorus Donors in Silicon

G. Ten Eyck, Sandia National Laboratory,
Back end processing and CV characterization for qubit devices

T. Thorbeck, JQI – NIST, University of Maryland,
Coulomb Blockade Transport though Unintentional Defects

L. A. Tracy, Sandia National Laboratory,
Two dimensional electron transport and RF measurements for Si quantum computing

J. van Donkelaar, University of Melbourne,
Progress in deterministic doping of single atoms in Si

D. S. Wang, University of Melbourne,
Error threshold simulations of surface and color codes

W. Witzel, Sandia National Laboratory,
Decoherence Induced by Dangling Bond Spins at a Si/SiO$_2$ Interface

F. A. Zwangenburg, University of New South Wales,
A single-electron Si metal-oxide-semiconductor quantum dot