

CURRICULUM VITAE

Joshua A. Folk

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EDUCATION:

- 1998-2003 PhD in Physics. Stanford University.
1991-1995 Bachelor of Science with Honors in Physics. Stanford University.

RESEARCH:

- 2005-present Assistant Professor in the Department of Physics and Astronomy at the University of British Columbia studying the physics of spin in nanostructures, ranging from single atoms and molecules to lithographically defined semiconductor quantum dots.
- 2005 Postdoctoral associate at Delft University of Technology, measuring the effects of the hyperfine interaction on entangled two-electron states in a double quantum dot.
- 2003-2004 Pappalardo Postdoctoral Fellow in the MIT Physics Department, currently working with Prof. Isaac Chuang studying transport detection of hyperfine interactions in single molecules. Work has included equipping lab of Prof. Chuang with experimental apparatus for low-temperature transport measurements.
- 1998-2003 Research assistant for Prof. Charles Marcus, at Stanford University and Harvard University. Performed transport measurements probing spin and decoherence properties of *GaAs/AlGaAs* nanostructures in dilution and ^3He refrigerators; fabricated devices using electron-beam and optical lithography. Also outfitted dilution refrigerator with optical access and studied optical polarization of nuclei in *GaAs* heterostructures.
- 1994-1995 Undergraduate research assistant for Prof. Charles Marcus, Stanford University. Measured transport properties of *GaAs* quantum dots.
- 1993 Summer research internship at Lawrence Livermore National Lab. Developed ion milling techniques for magnetic multilayer research.

FELLOWSHIPS AND AWARDS:

- 2003-2004 Pappalardo Postdoctoral Fellowship, MIT.
- 2001-2003 Stanford Graduate Fellowship, Stanford University.
- 1998-2001 National Defense Science and Engineering Graduate Fellowship, Department of Defense.
- 1998 National Science Foundation Graduate Research Fellowship (declined).
- 1995 Rebecca Carrington Award for excellence in research and teaching, Department of Physics, Stanford University.

TEACHING:

- 1999 Teaching assistant for Prof. Katherine Moler, Stanford University. Physics 61: advanced freshman physics course, first quarter.
- 1995-1997 High school teacher for U.S. Peace Corps, Tanzania. Taught classes and led laboratories for A-Level two-year physics curriculum.
- 1995 Teaching assistant for Prof. Mark Kasevich, Stanford University. Physics 107: junior-level laboratory course.

CONFERENCES AND SEMINARS:

- June 2005 Invited Talk, IBM Zurich, Zurich, Switzerland. "Control and Detection of Singlet-Triplet Mixing by a Random Nuclear Field."
- May 2005 Invited Talk. CIAR Quantum Materials Meeting, Vancouver, Canada. "Control and Detection of Singlet-Triplet Mixing by a Random Nuclear Field."
- May 2005 Invited Talk. Spin Transport and Dynamics in Nanostructures, Minneapolis, MN. "Control and Detection of Singlet-Triplet Mixing by a Random Nuclear Field."
- March 2005 Invited Talk. CIAR Nanoelectronics Meeting, Banff, Canada. "Kondo Effect in Bare Gold Junctions."
- March 2005 Condensed Matter Seminar. Institute of Molecular Physics, Poznan, Poland. "Kondo Effect in Electromigrated Gold Break Junctions."
- January 2005 Condensed Matter Seminar. RWTH-Aachen, Aachen, Germany. "Kondo Effect in Electromigrated Gold Break Junctions."
- November 2004 Condensed Matter Seminar. John Hopkins University, Baltimore, Maryland. "Kondo Effect in Electromigrated Gold Break Junctions."
- April 2004 Condensed Matter Seminar. University of Washington, Seattle, WA. "Controlling Entanglement in a Quantum Circuit."

- February 2004 Condensed Matter Seminar. UC Berkeley, Berkeley, CA. "Spin in Nanoscale Structures."
- February 2004 Condensed Matter Seminar. Rutgers University, New Brunswick, NJ. "Decoherence in Confined Systems."
- January 2004 Condensed Matter Seminar. Stanford, CA. "Creation and Detection of Spin Currents from Mesoscopic Structures."
- January 2004 Invited Talk. Princeton, NJ. "Spin in *GaAs* Quantum Dots."
- January 2004 Invited Talk. Winter Conference, Aspen, CO. "Creation and Detection of Spin Currents from Nanoscale Structures."
- November 2003 Condensed Matter Seminar. University of Washington, Seattle, WA. "Creation and Detection of Spin Currents from *GaAs* Quantum Dots."
- November 2003 Colloquium. University of Washington, Seattle, WA. "The Spin Physics of *GaAs* Quantum Dots."
- October 2003 Invited Talk. Wilhelm und Else Heraeus Seminar, Bad Honnef, Germany. "Creation and Detection of Spin Currents from *GaAs* Quantum Dots."
- May 2003 Center for Nanotechnology Seminar. University of Washington, Seattle, WA. "Measuring Spin in Mesoscopic Systems."
- March 2003 Invited Talk. APS March Meeting, Austin, TX. "Creation of a Bidirectional Spin Filter Using Quantum Coherence."
- January 2003 Seminar. NTT, Atsugi, Japan. "The Spin Physics of *GaAs* Quantum Dots."
- January 2003 Seminar. Tokyo University, Tokyo, Japan. "The Spin Physics of *GaAs* Quantum Dots."
- January 2003 Seminar. Delft University of Technology, Delft, The Netherlands. "The Spin Physics of *GaAs* Quantum Dots."
- April 2002 Chez Pierre Lecture, Massachusetts Institute of Technology, Cambridge, MA. "Detecting Spin Currents in Ballistic Nanostructures."
- March 2002 Poster presentation. SQUINT Conference, Boulder, CO.
- March 2001 Contributed talk. APS March Meeting, Seattle, WA. "Quantum Interference and Spin Transport using *GaAs* Quantum Dots."
- October 2000 Invited talk. After-Lunch Condensed Matter Theory Seminar, Harvard University, Cambridge, MA. "Spin Transport in Semiconductor Quantum Dots."
- July 2000 Poster presentation. Meso-Spin Conference, Cortona, Italy.
- March 2000 Invited talk. APS March Meeting, Minneapolis, MN. "Spin-Dependent Transport in Semiconductor Quantum Dots."

- March 1999 Contributed talk. APS March Meeting, Atlanta, GA. “Decoherence in Nearly-Isolated Quantum Dots.”
- March 1999 Condensed Matter Seminar, University of Washington, Seattle, WA. “Electron Dephasing in Semiconductor Quantum Dots: Low-temperature Anomalies in $\tau_\varphi(T)$.”
- March 1995 Contributed talk. APS March Meeting, San Jose, CA. “Temperature Dependence of Weak Localization in *GaAs* Quantum Dots.”

PUBLICATIONS:

J. A. Folk, S. R. Patel, S. F. Godign, A. G. Huibers, S. M. Cronenwett, C. M. Marcus, K. Campman and A. C. Gossard, “Statistics and Parametric Correlations of Coulomb blockade Peak Fluctuations in Quantum Dots”, *Phys. Rev. Lett.* **76**, 1699 (1996).

C. M. Marcus, S. R. Patel, A. G. Huibers, S. M. Cronenwett, M. Switkes, I. H. Chan, R. M. Clarke, J. A. Folk, S. F. Godign, K. Campman and A. C. Gossard, “Quantum chaos in open versus closed quantum dots: signatures of interacting particles”, *Chaos, Solitons and Fractals* **8**, 1261 (1997).

S. R. Patel, S. M. Cronenwett, A. G. Huibers, M. Switkes, J. A. Folk, C. M. Marcus, K. Campman and A. C. Gossard, “Universal fluctuations of Coulomb blockade peaks in quantum dots”, *Superlattices and Microstructures* **21**, 43 (1997).

C. M. Marcus, J. A. Folk, S. R. Patel, S. M. Cronenwett, A. G. Huibers, K. Campman and A. C. Gossard, “Mesoscopic fluctuations of tunneling and cotunneling in quantum dots”, *Superlattices and Microstructures* **23**, 161 (1998).

A. G. Huibers, J. A. Folk, S. R. Patel, C. M. Marcus, C. I. Duruoz and J. S. Harris Jr., “Low-Temperature Saturation of the Dephasing Time and Effects of Microwave Radiation on Open Quantum Dots”, *Phys. Rev. Lett.* **83**, 5090 (1999).

J. A. Folk, S. R. Patel, K. M. Birnbaum, C. M. Marcus, C. I. Duruoz and J. S. Harris Jr., “Spin Degeneracy and Conductance Fluctuations in Open Quantum Dots”, *Phys. Rev. Lett.* **86**, 2102 (2001).

B. I. Halperin, A. Stern, Y. Oreg, J. N. H. J. Cremers, J. A. Folk and C. M. Marcus, “Spin-orbit Effects in a *GaAs* Quantum Dot in a Parallel Field”, *Phys. Rev. Lett.* **86**, 2106 (2001).

J. A. Folk, C. M. Marcus, R. Berkovits, I. L. Kurland, I. L. Aleiner and B. L. Altshuler, “Ground state spin and Coulomb blockade peak motion in chaotic quantum dots”, *Physica Scripta* **T90**, 26 (2001).

J. A. Folk, C. M. Marcus, and J. S. Harris Jr., “Decoherence in Nearly-Isolated Quantum Dots”, *Phys. Rev. Lett.* **87**, 6802 (2001).

R. M. Potok, J. A. Folk, C. M. Marcus, and V. Umansky, “Detecting Spin Currents in Ballistic Nanostructures”, *Phys. Rev. Lett.* **89**, 266602 (2002).

J. A. Folk, R. M. Potok, C. M. Marcus, and V. Umansky, “A Gate-Controlled Bipolar Spin Filter Using Quantum Coherence”, *Science* **299**, 679 (2003).

R. M. Potok, J. A. Folk, C. M. Marcus, V. Umansky, M. P. Hansen, A. C. Gossard, “Spin and Polarized Currents from Coulomb Blockaded Quantum Dots”, *Phys. Rev. Lett.* **91**, 016802 (2003).

A. A. Houck, J. Labaziewicz, E. K. Chan, J. A. Folk, I. L. Chuang, “Kondo Effect in Electromigrated Break Junctions”, *cond-mat/0410752*, to be published in *Nano Letters*.

F. H. L. Koppens, J. A. Folk, et al., “Control and Detection of Singlet-Triplet Mixing By a Random Nuclear Field”, to be published in *Science*.

H. B. Heersche, Z. de Groot, J. A. Folk, et al., “The Kondo effect in the presence of magnetic impurities”, submitted to *PRL*.