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I. Professional Preparation

Iowa State University	Physics	B.S. 1959
Iowa State University	Physics	Ph.D. 1965
Cambridge University	Condensed Matter	Thesis Research & Post-doc, 1964-1967

II. Appointments

2006	Fellow of Joint Quantum Institute
1992, 1996-2005 (summers)	Institute of Physics, Polish Academy of Sciences, Warsaw, Visiting Professor
Jan. 98, 00, 02, 03, 04, 06	Visiting Professor, National Institute for Materials Science (Formerly National Research Institute for Metals) Tsukuba, Japan
2003	Tohoku University, Visiting Professor
1968-2000	Sandia Laboratories, Consultant
Feb. 1999	Visiting Professor, Kuwait University
1994-1995	Tohoku University, Research Institute for Scientific Measurements, Sendai, Japan, Visiting Professor
1990	Moscow State University, Visiting Professor
1990	Institute of High Pressure Physics, Moscow, USSR (Summer), Visiting Professor
1988, 1994, Jan. 1999	Tohoku University, Institute for Materials Research, Sendai, Japan, Visiting Professor
1984	Institute of Physics, Polish Academy of Sciences, Warsaw, Visiting Professor
1977-present	University of Maryland, Professor of Physics
1971-1977	University of Maryland, Associate Professor of Physics
1967-1971	University of Maryland, Assistant Professor of Physics

III. Honors and Awards since 1993:

University of Maryland International Travel Grant, 1994
Invited Lecturer at Brazilian Summer School on Semiconductor Physics, July 1993
Invited Lecturer at Polish Summer School on Condensed Matter Physics, July 1997, 1998, & 1999
Invited Lecturer at National Research Institute for Metals, Tsukuba, Japan, January 1998, 2000, 2003, 2004, & 2006
University of Maryland Landmark Award, 16 November 2004

IV. Papers Published - Physics Research since 2003 (* shows papers relevant to proposed purpose of the JQI):

- 1.* Spectroscopy of Capacitively Coupled Josephson-Junction Qubits, Philip R. Johnson, Frederick W. Strauch, Alex J. Dragt, Roberto C. Ramos, C. J. Lobb, J. R. Anderson, and F. C. Wellstood, *Phys. Rev. B* **67**, 020509 (Rapid Communications) (2003). Eprint: condmat/0210278.
- 2.* Characterization of an LC-Isolated Josephson-Junction Qubit”, A. J. Berkley, H. Xu, M. A. Gubrud, R. C. Ramos, Jr., J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. Appl. Supercon.* **13**, 952 (2003).
- 3.* Capacitively Coupled Josephson Junctions: a Two-Qubit System, R. C. Ramos, F. W. Strauch, P. R. Johnson, A. J. Berkley, H. Xu, M. A. Gubrud, J. R. Anderson, C. J. Lobb, A. J. Dragt, and F. C. Wellstood, *IEEE Trans. Appl. Supercon.* **13**, 994 (2003).
- 4.* Analysis of Energy Level Quantization and tunneling from the Zero-Voltage State of a Current-Biased Josephson Junction, H. Xu, A. J. Berkley, M. A. Gubrud, R. C. Ramos, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. Appl. Supercon.* **13**, 956 (2003).
- 5.* Entangled macroscopic quantum states in two superconducting qubits, A. J. Berkley, H. Xu, M. Gubrud, R. Ramos, F. W. Strauch, P. R. Johnson, J. R. Anderson, A. J. Dragt, C. J. Lobb, F. C. Wellstood, *Science* **300**, 1548 (2003).
- 6.* Response to Defining Entanglement by Antoni Wojcik, A. J. Berkley, H. Xu, M. Gubrud, R. Ramos, F. W. Strauch, P. R. Johnson, J. R. Anderson, A. J. Dragt, C. J. Lobb, F. C. Wellstood, *Science* **301**, 1183 (2003).
- 7.* Decoherence in a Josephson junction qubit, A. J. Berkley, H. Xu, M. Gubrud, R. Ramos, J. R. Anderson, C. J. Lobb, F. C. Wellstood, *Phys. Rev. B* **68** (Rapid Communications), 060502-1 (2003).
- 8.* Josephson-junction qubits: entanglement and coherence, J. R. Anderson, A. J. Berkley, A. J. Dragt, M. A. Gubrud, P. R. Johnson, C. J. Lobb, R. C. Ramos, F. W. Strauch, F. C. Wellstood, H. Xu, *Superlattices and Microstructures*, Elsevier Science, vol. **32**, Numbers 4-6, p. 231 (2003).
- 9.* Quantum logic gates for capacitively coupled Josephson Junctions, Frederick W. Strauch, Philip R. Johnson, Alex J. Dragt, C. J. Lobb, J. R. Anderson, and F. C. Wellstood, Eprint: quant-ph/0303002, *Phys. Rev. Lett.* **91**, 167005-1 (2003).
- 10.* Determination of the Relaxation Time of a Josephson Junction Qubit, S. K. Dutta, H. Xu, A. J. Berkley, R. C. Ramos, M. Gubrud, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *Phys. Rev. B* **70**, 140502 (R) (2004) Rapid Comm.
11. Magnetic Specific Heat of $\text{Pb}_{1-x}\text{Eu}_x\text{Te}$, M. Gorska, A. Lusakowski, A. Jedrzejczak, Z. Golacki, J. R. Anderson, and H. Balci, *Acta Physica Polonica* **A105**, 631 (2004).
- 12.* Spectroscopy of Three-Particle Entanglement in a Macroscopic Superconducting Circuit, Huizhong Xu, Fredrick W. Strauch, Sudeep Dutta, Phillip R. Johnson, R. C. Ramos, A. J. Berkley, H. Paik, J. R. Anderson, A. J. Dragt, C. J. Lobb, and F. C. Wellstood, *Phys. Rev. Lett.* **94**, 027003 (2005).
- 13.* Spectroscopic resonance broadening in a Josephson junction qubit due to current noise, H. Xu, A. J. Berkley, R. C. Ramos, M. A. Gubrud, P. R. Johnson, F. W.

- Strauch, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *Phys. Rev. B* **71**, 064512 (2005).14.*
- 14.* Single Josephson Junctions as Qubits, J. R. Anderson, A. J. Berkley, A. J. Dragt, S. Dutta, M. Górska, M. A. Gubrud, P. R. Johnson, C. J. Lobb, R. C. Ramos, F. W. Strauch, F. C. Wellstood, H. Xu in *Clusters and Nano-Assemblies, Physical and Biological Systems*, edited by P. Jena, S. N. Khanna, and B. K. Rao, World Scientific Pub. Co. p. 151 (2005).
 - 15.* Macroscopic tunnel splittings in superconducting phase qubits, Phillip R. Johnson, William T. Parsons, Frederick W. Strauch, J. R. Anderson, Alex Dragt, C. J. Lobb, and F. C. Wellstood, *Phys. Rev. Lett.* **94**, 187005 (2005).
 - 16.* A Cooper pair box as a variable capacitor, Hanhee Paik, F. W. Strauch, R. C. Ramos, A. J. Berkley, H. Xu, S. K. Dutta, P. R. Johnson, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. on Appl. Superconductivity* **15**, 884 (2005).
 - 17.* Initializing the Flux State of Multi-Well Inductively Isolated Josephson Junction Qubits, T. A. Palomaki, S. K. Dutta, H. Paik, H. Xu, J. Matthews, R. M. Lewis, R. C. Ramos, K. Mitra, Philip R. Johnson, Frederick W. Strauch, A. J. Dragt, C. J. Lobb, J. R. Anderson and F. C. Wellstood, *Phys. Rev. B* **73**, 014520 (2006).
 18. Magnetic Contribution to the Specific Heat of $\text{Pb}_{1-x}\text{Eu}_x\text{Te}$ ($x=0.027, 0.073$), M. Górska, A. Lusakowski, A. Jedrejczak, Z. Golacki, R. R. Galazka, J. R. Anderson, and H. Balci, *Phys. Rev. B* **73**, 125201 (2006).
 19. Magnetic Contribution to the Specific Heat of IV-VI Semimagnetic Semiconductors, M. Górska, A. Lusakowski, J. R. Anderson, Y. Dagan, Z. Golacki, and R. R. Galazka, *Proceedings of the 12th International Conference on Narrow Gap Semiconductors*, Toulouse, France, 3-7 July, 2005, in “Narrow Gap Semiconductors”, ed. by J. Kono and J. Leotin, Taylor and Francis, UK, p. 173 (2006).
 - 20.* Increasing Spectroscopic Coherence Times of a DC SQUID Phase Qubit by Operating Deeper in the Potential Well, R. M. Lewis, S. K. Dutta, Hanhee Paik, T. A. Palomaki, B. K. Cooper, A. J. Przybysz, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. Appl. Supercond.* **17**, 101-104 (2007).
 - 21.* Strong Field Effects in the Rabi Oscillations of the Superconducting Phase Qubit, F. W. Strauch, S. K. Dutta, H. Paik, T. A. Palomaki, K. Mitra, B. K. Cooper, R. M. Lewis, J. R. Anderson, A. J. Dragt, C. J. Lobb, F. C. Wellstood, *IEEE Trans. Appl. Supercond.* **17**, 105-108 (2007).
 - 22.* Rabi Measurement of Decoherence in Three dc SQUID Phase Qubits, Hanhee Paik, B. K. Cooper, S. K. Dutta, R. M. Lewis, R. C. Ramos, T. A. Palomaki, A. J. Przybysz, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. Appl. Supercond.* **17**, 120-123 (2007).
 - 23.* Pulse Current Measurements and Rabi Oscillations in a dc SQUID Phase Qubit, T. A. Palomaki, S. K. Dutta, R. M. Lewis, Hanhee Paik, K. Mitra, B. K. Cooper, A. J. Przybysz, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *IEEE Trans. Appl. Supercond.* **17**, 162-165 (2007).
 - 24.* Dephasing and Noise in dc SQUID Phase Qubits, Hanhee Paik, S. K. Dutta, R. M. Lewis, T. A. Palomaki, B. K. Cooper, R. C. Ramos, H. Xu, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, *Phys. Rev. B* – to be published.

V. Invited Presentations since 2003 (* shows presentations relevant to proposed purpose of the JQI):

- 1.* “Single Josephson-Junction Qubits”, Presented at the 8th International Symposium on Advanced Fields on Advanced Materials for Quantum Computing (APF8), Tsukuba, Japan, 14-17 January (2003). Co-authors: A. J. Berkley, A. J. Dragt, M. A. Gubrud, P. R. Johnson, C. J. Lobb, R. C. Ramos, F. W. Strauch, F. C. Wellstood, and H. Xu.
- 2.* “Introduction to Quantum Computing”, Presented at the National Institute for Materials Science, Tsukuba, 24 January, 2003.
- 3.* “Quantum Computing with Josephson-Junction Qubits”, Presented at the Center for Interdisciplinary Research, Tohoku University, Sendai, Japan, 28 January 2003.
- 4.* “Diluted Magnetic Semiconductors: Thermoelectric and Magnetic Properties”, Presented at Ryukyu University, Nishihara, Okinawa, Japan, 31 January 2003. Co-author: M. Górska.
5. “Diluted Magnetic Semiconductors: Thermoelectric and Magnetic Properties”, Presented at Hokkaido University, Sapporo, Japan, 6 February 2003. Co-author: M. Górska.
- 6.* “Quantum Computing with Josephson Junction Qubits”, Colloquium presented at Virginia State University, Petersburg, VA, 14 June 2003.
7. “Thermoelectric Possibilities for IV-VI DMS Systems”, Presented at the 3rd Center of Excellence for Low Dimensional Structures (CELDIS) Workshop on Low Dimensional and Hybrid Diluted Magnetic Semiconductor Structures, Warsaw, Poland, 27-28 June 2003. Co-author: M. Górska.
- 8.* “Quantum Computing the Hard Way: Josephson Junction Approach”, Colloquium presented at Virginia Commonwealth University, Richmond, VA, 23 January 2004.
9. “Thermal and Magnetic Properties of IV-VI Diluted Magnetic Semiconductors”, Seminar presented at Penn State University, University Park, PA, 26 May 2004.
- 10.* “Quantum Computing Based on Single Josephson-Junction Qubits”, QUIC Seminar presented at NRL, 23 September 2004.
11. “Magnetic Contribution to the Specific Heat of IV-VI Semimagnetic Semiconductors”, Presented by M. Górska at the 12th International Conference on Narrow-Gap Semiconductors, Toulouse, France, 3-7 July 2005. Co-authors A. Lusakowski, J. R. Anderson, Y. Dagan, Z. Golacki, and R. R. Galazka.
- 12.* “Quantum Computing Based on Single Josephson-Junction Qubits”, Seminar presented at the Laboratory for Physical Sciences, 21 September 2005.
- 13.* “Quantum Computing Based on Single Josephson-Junction Qubits”, Seminar presented at George Mason University, 31 October 2005.
- 14.* “Progress in Josephson-Junction-Based Quantum Computing”, Colloquium presented at the Center for Interdisciplinary Research, Tohoku University, Sendai, Japan, 16 January 2006.

15. “Magnetically Tunable Detectors Based on III-V Semiconductors”, Presented at the New Horizon in High Magnetic Fields International Workshop on High Magnetic Fields, National Institute for Materials Science, Tsukuba, Japan, 17-20 January 2006.
- 16.* “Quantum Computation Based on Single Josephson-Junction Qubits”, Seminar presented at the National Institute for Materials Science, Tsukuba, Japan, 23 January 2006.
- 17.* “Quantum Computing Algorithms and Josephson-Junction-Based Qubits”, Seminar presented in UMD Math Department, 26 April 2006.
- 18.* “Quantum Computers Based on Josephson-Junction Systems”, Seminar presented at the University of Minnesota, Minneapolis, 20 July 2006.
- 19.* “The Superconductivity Approach to Quantum Computing”, Invited Seminar at the University of Wisconsin, 27 August 2007.
- 20.* “Quantum Algorithms and Quantum Computing”, Invited Seminar at St John’s University, St. Joseph, Minnesota, 24 August 2007.

VI. Contributed Presentations Since 2006

1. “Anomalously Low tunneling Escape Rates from the Excited States of an Inductively-Isolated Current-Biased Josephson Junction Phase Qubit”, R. M. Lewis, T. A. Palomaki, Hanhee Paik, S. K. Dutta, A. Przybysz, B. K. Cooper, J. R. Anderson, A. J. Dragt, C.J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Baltimore, 17 March 2006.
2. “Variable Coupling between the Inductively Isolated Current-Biased Josephson Junction Qubit and the Current Bias Leads”, Hanhee Paik, S. K. Dutta, R. M. Lewis, R. C. Ramos, H. Xu, T. A. Palomaki, B. K. Cooper, A. J. Przybysz, A. J. Dragt, J. R. Anderson, C.J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Baltimore, 17 March 2006.
3. “Analysis of Rabi Oscillations of a Josephson Phase Qubit”, S. K. Dutta, H. Xu, Frederick W. Strauch, Philip R. Johnson, R. C. Ramos, T. A. Palomaki, Hanhee Paik, R. M. Lewis, J. R. Anderson, Alex J. Dragt, C.J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Baltimore, 17 March 2006.
4. “Two Coupled Inductively-Isolated Josephson Junction Qubits”, Tauno Palomaki, Sudeep Dutta, Hanhee Paik, Rupert Lewis, Roberto Ramos, Huizhong Xu, Bob Anderson, Chris Lobb, and Fred Wellstood, presented at the Meeting of the American Physical Society in Baltimore, 17 March 2006.
5. “Flux Noise in an Inductively Isolated Josephson Junction Qubit”, B. K. Cooper, Hanhee Paik, R. M. Lewis, S. K. Dutta, T. A. Palomaki, A. J. Przybysz, J. R. Anderson, Alex J. Dragt, C.J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Baltimore, 17 March 2006.
6. “rf-reflectometry Measurements of a Josephson Junction Oscillator Circuit at MilliKelvin Temperatures”, R. M. Lewis, B. K. Cooper, B. Palmer, Hanhee Paik, S. K. Dutta, T. A. Palomaki, A. J. Przybysz, H. Kwon, J. R. Anderson, A. J. Dragt, C. J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.

7. "An Asymmetric SQUID for Measurement of Ultra-small Josephson Junctions", D. F. Sullivan, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.
8. "Quantum Behavior of the dc SQUID Phase Qubit", Kaushik Mitra, F. W. Strauch, Hanhee Paik, S. K. Dutta, R. M. Lewis, T. A. Palomaki, A. J. Przybysz, B. K. Cooper, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.
9. "Strong Field Effects in Rabi Oscillations of the dc SQUID Phase Qubit", S. K. Dutta, T. A. Palomaki, R. M. Lewis, K. Mitra, Hanhee Paik, J. R. Anderson, Alex j. Dragt, C. J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.
10. "Evidence of Microstates in dc SQUID Phase Qubits", Tauno Palomaki, Sudeep Dutta, Rupert Lewis, Anthony Przybysz, Hanhee Paik, Kaushik Mitra, Ben Cooper, Hyeokshin Kwon, Alex Dragt, J. R. Anderson, Chris Lobb, and Fred Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.
11. "In Situ Variation of the Coupling of a dc SQUID Phase Qubit to its Bias Leads", Hanhee Paik, S. K. Dutta, R. M. Lewis, T. A. Palomaki, B. K. Cooper, A. J. Przybysz, Hyeokshin Kwon, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, presented at the Meeting of the American Physical Society in Denver, 5-9 March 2007.
12. "Magnetic Properties of $\text{Ge}_{1-x}\text{Mn}_x\text{Te}$ Thin Films", James R. Anderson, W. Knoff, Malgorzata Gorska, T. Story, and Costel R. Rotundu – J33.00005
13. "Improving dc SQUID Phase Qubit Lifetimes through Increased Isolation from Bias Leads", Anthony Przybysz, Tauno Palomaki, Sudeep Dutta, Fred Wellstood, Rupert Lewis, Hanhee Paik, Hyeokshin Kwon, Ben Cooper, Kaushik Mitra, Bob Anderson, Alex Dragt, and Chris Lobb – H15.00007
14. "Small Josephson junctions in asymmetric SQUIDs", Dan Sullivan, Tauno Palomaki, Mark Gubrud, Michael Dreyer, Barry Barker, James Anderson, Chris Lobb, and Fred Wellstood – H10.00005
15. "Multi-level Spectroscopy of Microstates Coupled to a dc SQUID Phase Qubit", Tauno Palomaki, S. K. Dutta, A. J. Przybysz, Hanhee Paik, B. K. Cooper, H. Kwon, E. Tiesinga, J. R. Anderson, C. J. Lobb, and F. C. Wellstood – L28.00003
16. "Microwave Reflectometry Measurements of Flux States of a dc SQUID Phase Qubit", B. K. Cooper, R. M. Lewis, S. K. Dutta, T. A. Palomaki, Anthony Przybysz, H. Kwon, Hanhee Paik, J. R. Anderson, C. J. Lobb, and F. C. Wellstood – P15.00007
17. "Measurements of a dc-SQUID phase qubit using rf-reflectometry", R. M. Lewis, B. K. Cooper, S. K. Dutta, T. A. Palomaki, Hanhee Paik, A. Przybysz, H. Kwon, J. R. Anderson, C. J. Lobb, and F. C. Wellstood – P15.00008
18. "DC SQUID Phase Qubit with LC Filter", Hyeokshin Kwon, A. J. Przybysz, Hanhee Paik, R. M. Lewis, T. A. Palomaki, S. K. Dutta, B. K. Cooper, J. R. Anderson, C. J. Lobb, and F. C. Wellstood – P15.00009

Session Chairman , W39: Superconductivity-Josephson Junctions and Qubits. Thursday, 16 March 2006 at the Meeting of the American Physical Society in Baltimore.

2006-2007 Grad Students (QC Group): Sudeep Dutta*, Hanhee Paik**, Tauno Palomaki, Ben Cooper, Tony Przybylsz, Hyeokshin Kwon, Paul Patrone

* Received Ph.D. Dec. 2006

** Received Ph.D. 2007

2006-2007 Grad Students (LPS)*** : Benedetta Camarota, Mark Gubrud, Jared Hertzberg, Robert McFarland

*** These students have a thesis advisor at LPS.

2006-2007 Undergrad Students (QC Group): Mohamed Abutaleb, Sam Brin, Ameer Abutaleb

2006-2007 Thesis Orals: Sudeep Dutta, Akshay Naik, Younggu Kim (EE), Abdelkrim Bourouhiya (Math), Betsy Pugel, Hanhee Paik, Yu Jiang, Alex Grushin, Su Li, Pengcheng Li, David Tobias, Shixiong Zhang, Benedetta Camarota

Committees: Salary Committee, Faculty Council*, APT Committee – Co-chair, East Asia Committee, International Travel Committee, Banneker/Key Committee, Feynman Festival Committee, Expanded Qualifying Exam Committee, LPS Seminar Co-coordinator.

* Has not met in 2007 or 2008 as far as I know.