

CV of Frederick Charles Wellstood
Department of Physics, University of Maryland at College Park

Educational Background

Ph.D. in Physics

University of California, Berkeley, CA, December, 1988.
Thesis Title: "Excess Noise in the dc SQUID; 4.2 K to 20 mK"
Advisor: Professor John Clarke

A.B. in Physics

University of California, Berkeley, CA, December 1979.

Employment Background:

Fellow of the Joint Quantum Institute

Department of Physics, University of Maryland, College Park
(from September 2006 to present).

Professor of Physics

Center for Nanophysics and Advanced Materials
(Center's name changed from Center for Superconductivity Research on July 1, 2007)
Department of Physics, University of Maryland, College Park
(from July 2002 to present).

Affiliate Professor

Department of Electrical and Computer Engineering
University of Maryland, College Park
(From January 1, 2006 to 2012)

Associate Chair for Undergraduate Education, Physics

Department of Physics, University of Maryland, College Park
(from July 1999 to July 2004).

Associate Professor of Physics

Center for Superconductivity Research
Department of Physics, University of Maryland, College Park
(from July 1997 to July 2002).

Assistant Professor of Physics

Center for Superconductivity Research
Department of Physics, University of Maryland, College Park
(half-time from January 1991 to June 1991, full-time from July 1991 to July 1997).

Postdoctoral Fellow

under Professor John Clarke, Department of Physics, University of California, Berkeley, CA; and Center for Advanced Materials, Material Sciences Division, Lawrence Berkeley Laboratory, Berkeley, CA 94720, (December 1988 to June 1991). Developed first multilayer interconnect technology for high- T_c superconductors.

Graduate Student Research Assistant

under Professor John Clarke, Department of Physics, University of California at Berkeley, and Materials and Chemical Sciences Division, Lawrence Berkeley Laboratory, Berkeley, CA 94720 (October 1982 to November 1988).

Graduate Student Teaching Assistant

Department of Physics, University of California, Berkeley (September 1980 to June 1982.)

Student Intern

under Dr. Darwin Ellis, Schlumberger-Doll Research Center, Ridgefield, Conn. 06877, (January 1980 to September 1980, and June 1979 to September 1979). Developed and used computer programs which simulated electron and gamma ray transport in oil well boreholes for the purpose of determining the chemical composition of the surrounding matrix.

2. Research, Scholarly, and Creative Activities

2.a. Books

none

2.b. Articles in refereed journals

1. "**Integrated dc SQUID magnetometer with a high slew rate**", F. C. Wellstood, C. Heiden, and J. Clarke, *Rev. Sci. Instrum.* **55**, 952 (1984).
2. "**Low Frequency Noise in Nb-Al₂O₃-Nb Josephson Tunnel Junctions**", B. Savo, F. C. Wellstood, and J. Clarke, *Appl. Phys. Lett.* **50**, 1757 (1987).
3. "Upper Limit on the Resistivity of La_{1.85}Sr_{0.15}CuO₄", F. C. Wellstood, M. J. Ferrari, J. Clarke, A. M. Stacy, A. Zettl, and M. L. Cohen, *Phys. Lett. A*, **122**, 61 (1987).
4. "Excess Noise in dc SQUIDs from 4.2 K to 0.022 K", F. C. Wellstood, C. Urbina, and J. Clarke, *IEEE Trans. Magn.*, **MAG-23**, 1662 (1987). [[PDF Full-Text \(488KB\)](#)]
5. "**Low Frequency Noise in dc Superconducting Quantum Interference Devices Below 1K**", F. C. Wellstood, C. Urbina, and J. Clarke, *Appl. Phys. Lett.*, **50**, 772 (1987).
6. "Excess Noise in the dc SQUID: 4.2 K to 20 mK", F. C. Wellstood, Ph.D. Thesis, University of California, Berkeley (1988).
7. "**Response to ``Comment on `Low-frequency excess noise in Nb-Al₂O₃-Nb Josephson tunnel junctions`**", B. Savo, F. C. Wellstood, and J. Clarke, *Appl. Phys. Lett.* **52**, 2001 (1988).
8. "**Magnetic flux noise in thin-film rings of YBa₂Cu₃O_{7-d}**", M. J. Ferrari, M. Johnson, F. C. Wellstood, J. Clarke, P. A. Rosenthal, R. H. Hammond, and M. R. Beasley, *Appl. Phys. Lett.* **53**, 695 (1988).
9. "Particle Detection with Semiconductor Thermistors at Low Temperatures", N. Wang, J. Beeman, A. N. Cleland, A. Cummings, E. E. Haller, A. Lange, R. Ross, B. Sadoulet, H. Steiner, T. Shutt, and F. C. Wellstood, *IEEE Trans. Nuc. Sci.* **36**, 852 (1989). [[PDF Full-Text \(540KB\)](#)]
10. "Low Magnetic Flux Noise Observed in Laser-deposited *in situ* Films of YBa₂Cu₃O_y and Implications for High T_c SQUIDs", M. J. Ferrari, M. Johnson, F. C. Wellstood, J. Clarke, A. Inam, X. D. Wu, L. Nazar, and T. Venkatesan, *Nature* **341**, 723 (1989).

11. "Flux Noise and Flux Creep in YBCO Thin Films", M. J. Ferrari, M. Johnson, F. C. Wellstood, J. Clarke, P. A. Rosenthal, R. H. Hammond, and M. R. Beasley, IEEE Trans. Magn., **MAG-25**, 806 (1989). [[PDF Full-Text \(320KB\)](#)]
12. "Hot Electron Effect in the dc SQUID", F. C. Wellstood, C. Urbina, and J. Clarke, IEEE Trans. Magn., **MAG-25**, 1001 (1989). [[PDF Full-Text \(356KB\)](#)]
13. "**Hot-electron limitation to the sensitivity of the dc superconducting quantum interference device**", F. C. Wellstood, C. Urbina, and J. Clarke, Appl. Phys. Lett. **54**, 2599 (1989).
14. "Electrical and thermal properties of neutron-transmutation-doped Ge at 20 mK", N. Wang, F. C. Wellstood, B. Sadoulet, E. E. Haller, and J. Beeman, Phys. Rev. B. **41**, 3761, (1990). [[PROLA Link](#)]
15. "Distribution of Flux Pinning Energies in $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ from Flux Noise", M. J. Ferrari, M. Johnson, F. C. Wellstood, J. Clarke, D. Mitzi, P. A. Rosenthal, C. B. Eom, T. H. Geballe, A. Kapitulnik, and M. R. Beasley, Phys. Rev. Lett. **64**, 72 (1990).
16. "Multilayer $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ - SrTiO_3 - $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Films for Insulating Crossovers", J. J. Kingston, F. C. Wellstood, P. Lerch, A. H. Miklich, and J. Clarke, Appl. Phys. Lett. **56**, 189 (1990).
17. "Josephson weak links in thin films of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ induced by electrical pulses", D. Robbes, A. H. Miklich, J. J. Kingston, P. Lerch, F. C. Wellstood, and J. Clarke, Appl. Phys. Lett. **56**, 2240 (1990).
18. "Superconducting Thin-Film Multiturn Coils of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", F. C. Wellstood, J. J. Kingston, and J. Clarke, Appl. Phys. Lett. **56**, 2336 (1990).
19. "Superconducting thin-film flux transformers of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", F. C. Wellstood, J. J. Kingston, M. J. Ferrari, and J. Clarke, Appl. Phys. Lett. **57**, 1930 (1990).
20. "Reply to "Flux-Pinning Energies in High- T_c Superconductors"", M. J. Ferrari, M. Johnson, F. C. Wellstood, J. Clarke, D. Mitzi, P. A. Rosenthal, C. B. Eom, T. H. Geballe, A. Kapitulnik, and M. R. Beasley, Phys. Rev. Lett. **65**, 279 (1990). [[PROLA Link](#)]
21. "**Random telegraph signals in high-temperature superconductors**", M. Johnson, M. J. Ferrari, F. C. Wellstood, J. Clarke, M. R. Beasley, A. Inam, X. D. Wu, and T. Venkatesan, Phys. Rev. B **42**, Rapid Communications, 10792 (1990).
22. "Erratum: Josephson weak links in thin films of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ induced by electrical pulses [Appl. Phys. Lett. **57**, 1169 (1990)]", D. Robbes, A. H. Miklich, J. J. Kingston, Ph. Lerch, F. C. Wellstood, and John Clarke Appl. Phys. Lett. **57**, 1169 (1990)
23. "Flux Noise from Superconducting $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Flux Transformers", M. J. Ferrari, J. J. Kingston, F. C. Wellstood, and J. Clarke, Appl. Phys. Lett. **58**, 1106 (1991).
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25. "Magnetic Flux Noise in High- T_c Superconductors", M. Johnson, M. J. Ferrari, F. C. Wellstood, and J. Clarke, Phys. Rev. Lett. **66**, 1799 (1991).
26. "Low Frequency Noise in Resonant Josephson Soliton Oscillators", J. B. Hansen, T. Holst, F. C. Wellstood, J. Clarke, IEEE Trans. on Magn., **MAG-27**, 3343 (1991). [[PDF Full-Text \(264KB\)](#)]
27. "Photolithographically Patterned Thin-film Multilayer Devices of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", J. J. Kingston, F. C. Wellstood, D. Quan, and J. Clarke, IEEE Trans. on Magn., **MAG-27**, 974 (1991). [[PDF Full-Text \(400KB\)](#)]
28. "Thin-film Flux Transformers of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", F. C. Wellstood, J. J. Kingston, M. J. Ferrari, and J. Clarke, IEEE Trans. on Magn., **MAG-27**, 2569 (1991). [[PDF Full-Text \(388KB\)](#)]

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36. "High- T_c Superconducting Multilayers for SQUID Magnetometers", J. Clarke, J. J. Kingston, A. H. Miklich, and F. C. Wellstood, Physica Scripta T **42**, 51 (1992).
37. "[One-dimensional magnetic flux microscope based on the dc superconducting quantum interference device](#)", A. Mathai, D. Song, Y. Gim, and F. C. Wellstood, Appl. Phys. Lett. **61**, 598 (1992).
38. "High Resolution Magnetic Microscopy Using a dc SQUID", A. Mathai, D. Song, Y. Gim, and F. C. Wellstood, IEEE Trans. on Appl. Supercond. **3**, 2609 (1993). [[PDF Full-Text \(684KB\)](#)]
39. "SQUID Milliatovoltometry of $YBa_2Cu_3O_7$ Thin Films: Dissipation in Low Magnetic Fields", F. C. Wellstood, M. J. Ferrari, J. J. Kingston, T. J. Shaw, and J. Clarke, Phys. Rev. Lett. **70**, 89 (1993). [[PROLA Link](#)]
40. "[Magnetic microscopy using a liquid nitrogen cooled \$YBa_2Cu_3O_7\$ superconducting quantum interference device](#)", R. C. Black, A. Mathai, F. C. Wellstood, G. Dantsker, A. H. Miklich, D. T. Nemeth, J. J. Kingston, and J. Clarke, Appl. Phys. Lett. **62**, 2128, (1993).
41. "[Electric field effect control of a superconducting \$YBa_2Cu_3O_7\$ inductor](#)", Y. Gim, C. Doughty, X. X. Xi, A. Amar, T. Venkatesan, and F. C. Wellstood, Appl. Phys. Lett. **62**, 3198 (1993).
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43. "[Eddy current microscopy using a 77-K superconducting sensor](#)", R. C. Black, F. C. Wellstood, E. Dantsker, A. H. Miklich, J. J. Kingston, D. T. Nemeth and J. Clarke, Applied Physics Letters **64**, 100 (1994).
44. "[Hot-electron effects in metals](#)", F. C. Wellstood, C. Urbina, and J. Clarke, Phys. Rev. B **49**, 5942 (1994). [[PROLA Link](#)]
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47. "Thin-film multilayer interconnect technology for $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", Invited, Journal of Applied Physics (Applied Physics Reviews) **75**, 683 (1994).
48. "Experimental Determination of the Symmetry of the Order Parameter in YBCO", A. Mathai, Y. Gim, R. C. Black, A. Amar, and F. C. Wellstood, Journal of Superconductivity **8**, no 1, 1995.
49. "Imaging radio-frequency fields using a scanning SQUID microscope", R. C. Black, F. C. Wellstood, E. Danstker, A. H. Miklich, D. T. Nemeth, D. Koelle, F. Ludwig, and J. Clarke, Appl. Phys. Lett. **66**, 1267, (1995).
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51. "Advantages of Superconducting Coulomb-Blockade Electrometers", D. Song, A. Amar, C. J. Lobb and F. C. Wellstood, IEEE Trans. on Appl. Supercond. **5**, (1995). [[PDF Full-Text \(396KB\)](#)]
52. "High-Frequency Microscopy Using a High- T_c SQUID", R. C. Black, F. C. Wellstood, E. Danstker, A. H. Miklich, D. Koelle, F. Ludwig and J. Clarke, IEEE Trans. on Appl. Superconductivity **5**, 2137 (1995). [[PDF Full-Text \(500KB\)](#)]
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54. "Application of single electron tunneling: Precision capacitance ratio measurements", A. F. Clark, Neil M. Zimmerman, Edwin R. Williams, A. Amar, D. Song, F. C. Wellstood, C. J. Lobb, and R. J. Soulen, Appl. Phys. Lett. **66**, 2588 (1995).
55. "Microwave microscopy using a superconducting quantum interference device", R. C. Black, F. C. Wellstood, E. Dantsker, A. H. Miklich, D. T. Nemeth, D. Koelle, F. Ludwig, J. Clarke, Appl. Phys. Lett, **66**, 99 (1995).
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58. "Scanning Microwave Microscopy of Active Superconducting Microwave Devices", S. M. Anlage C. P. Vlahacos, S. Dutta and F. C. Wellstood, IEEE Trans. on Applied Superconductivity **7**, 3686 (1997). [[PDF Full-Text \(1140KB\)](#)]
59. "35 \hbar Two-stage SQUID System for Gravity Wave Detection", I. Jin, A. Amar, T. R. Stevenson, F. C. Wellstood, A. Morse, and W. W. Johnson, IEEE Trans. on Applied Superconductivity **7**, 2742 (1997). [[PDF Full-Text \(680KB\)](#)]
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61. "Superconducting Coulomb-blockade Electrometers with Tunable Josephson Coupling", A. Amar, D. Song, C. J. Lobb, and F. C. Wellstood, IEEE Trans. on Appl. Superconductivity **7**, 3544 (1997). [[PDF Full-Text \(332KB\)](#)]
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65. "**Surface resistance imaging with a scanning near-field microwave microscope**", D. E. Steinhauer, C. P. Vlahacos, S. K. Dutta, F. C. Wellstood, and S. M. Anlage, App. Phys. Lett. **71**, 1736 (1997). [cond-mat/9712142](#) [[abs](#), [ps](#), [pdf](#), [other](#)]
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68. "**Behavior of Al—Al₂O₃--Al single-electron transistors from 85 mK to 5 K**", M. Kenyon, A. Amar, D. Song, C. J. Lobb, and F. C. Wellstood, Appl. Phys. Lett. **72**, 2268 (1998).
69. "**Microwave electric-field imaging using a high-T_c scanning superconducting quantum interference device**", S. Chatrathorn, E. F. Fleet, R. C. Black, and F. C. Wellstood, Appl. Phys. Lett. **73**, 984 (1998).
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73. "**Imaging microwave electric fields using a near-field scanning microwave microscope**", S. K. Dutta, C. P. Vlahacos, D. E. Steinhauer, A. S. Thanawalla, B. J. Feenstra, F. C. Wellstood, and S. M. Anlage, Appl. Phys. Lett. **74**, 156 (1999). [cond-mat/9811140](#) [[abs](#), [ps](#), [pdf](#), [other](#)].
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<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.167002> .
- 173.** “3D Fault Isolation on FBI Modified Multilayer Structure Device Using 3D Magnetic Field Imaging”, Alex Jeffers, Antonio Orozco, Nicolas Gagliolo, F. C. Wellstood, and A. B. Cawthorne, submitted to *The 36th Annual NANO Testing Symposium*, Nov 9-11 (2016) Osaka, Japan.
- 174.** “Microwave photon Fock state generation by stimulated Raman adiabatic passage”, Shavindra P. Premaratne, F. C. Wellstood and B. S. Palmer, *Nature Comm.* **8**, 14148 (2017).
<http://www.nature.com/articles/ncomms14148>
- 175.** “Simultaneously scanning connected tips in a dual-tip STM”, Simultaneously scanning two connected tips in a scanning tunneling microscope”, Wan-Ting Liao, C. J. Lobb, F. C. Wellstood, and M. Dreyer, *Jour. of Appl. Phys.* **121**, 214501 (2017).
- 176.** “Microwave attenuators for use with quantum devices below 100 mK”, Jen-Hao Yeh, Jay LeFebvre, Shavindra Premaratne, F. C. Wellstood, and B. S. Palmer, *Jour. Appl. Phys.* **121**, 224501 (2017).

2.c. Monographs, Reports and Extension Publications

1. "Report to Quantum Magnetism on Phase I Subcontract Work on NDE using High- T_c SQUIDs from 9-1-93 to 12-15-93." F. C. Wellstood (1993).
2. "SQUID Microscope Design Study for Biological Samples", report to J. P. Wikswo on the design of a SQUID microscope for biological samples, F. C. Wellstood, 6-13-96

2.d. Book Reviews, Other Articles and Notes

1. "Excess Noise in the dc SQUID: 4.2K to 20mK", F. C. Wellstood, Physics Ph.D. Thesis, University of California, Berkeley, (1988).

2.e. Talks, Abstracts, and Other Professional papers presented

2.e.i. Invited talks

1. "Excess $1/f$ flux noise in Superconducting Devices", Symposium in Honor of John Clarke's 75th anniversary, UC Berkeley, Jan. 10, 2017.
2. "Towards a Superconducting-Atom Hybrid Qubit System", Linnaeus Colloquium, Chalmers University, Gothenburg, Sweden, Nov. 17, 2016.
3. "Workshop on Superconducting and Quantum Devices", 2016 Applied Superconductivity Conference, 8:30AM-4:30 PM, Sunday, Sept. 4, 2016.
4. "Superconductivity", JQI Science Fiction Writers Workshop, University of Maryland, College Park, July 28, 2016.
5. "Quantum Computers", IEEE Electron Device Society/ Baltimore Chapter, College Park MD, Oct. 1, 2015.
6. "Qubits and Quantum Computation", Workshop Short Course for the 2014 Applied Superconductivity Conference, Charlotte, North Carolina, August 11, 2014.
7. "Superconducting Qubits", Workshop Session of the 2012 Applied Superconductivity Conference, Portland, Oregon, October 6, 2012.
8. "Superconducting Qubits", Workshop Session of the 2010 Applied Superconductivity Conference, August 2010.
9. "The Unusual Behavior of $1/f$ Flux Noise at Temperatures below 1 K", Electron Glass Program, KITP, August, 2010.
10. "Noise and decoherence in SQUID Phase qubits", Solid State Colloquium, Rutgers University, Oct 20 2009.
11. "Two Level Fluctuators in Charge and Phase Qubits", Linne Symposium, Chalmers University, Gothenburg, Sweden, February 21, 2008.
12. Member of a panel discussion on decoherence, Decoherence in superconducting quantum devices, Berkeley CA, December 7, 2007.
13. "Junctions and Atoms", Invited, Inaugural Symposium of the Joint Quantum Institute, March 12, 2007.
14. "The dc SQUID qubit", June 12, 2006, invited, MQC2 Conference, Naples, Italy.
15. "Quantum Computing Using Superconducting Devices: The dc SQUID qubit", Plasma 2006, London, England, July 17, 2006.
16. "Short Course on Quantum Computing using Superconducting Devices", invited for workshop at ASC 2006, Seattle, Washington, August 27, 2006.
17. "1, 2, 3, Superconducting Qubits", Physics Department Colloquium, University of Georgia, Athens, Sept. 8, 2005.

18. "1, 2, 3, Superconducting Qubits" Solid State Colloquium, Physics Department, University of Pennsylvania, Nov. 30, 2004.

2.e.i. Invited talks (continued)

19. "Microwave spectroscopy of Coupled Macroscopic Superconducting Qubits", 1 hour, invited, Physics Department, University of Chulalongkorn, Bangkok, Thailand, July 29, 2004.
20. "SQUID Microscopy of Integrated Circuits", 1 hour, invited, Physics Department, University of Chulalongkorn, Bangkok, Thailand, July 28, 2004.
21. "Evidence for Entangled Macroscopic Quantum States in Superconducting Qubits", 30 minutes, invited, March Meeting of the American Physical Society, March 23, 2004.
22. "Evidence of Entanglement in Josephson Junction Qubits", 15 minutes, Invited, given to the CMPS Academic Council, March 12, 2003.
23. "Evidence of Entanglement in Josephson Junction Qubits", 30 minutes, Invited, given at the Physics Faculty retreat, April 12, 2003.
24. "Evidence for quantum entanglement between two Josephson-junction qubits", Invited, 60 minutes, NIST AMO group colloquium, May 14, 2003.
25. "Microwave Spectroscopic Evidence for Entangled States in Two Coupled Josephson Junctions", Invited, 50 minutes, ISEC 2003, Sydney, Australia, July 11, 2003
26. "Ultimate limits of Scanning SQUID Microscopy", 20 minutes, Applied Superconductivity Conference, Houston, Texas, Sept. 2002.
27. "Using SQUIDs to Image Chips and Brains", 20 minutes, Ceremony for the dedication of the 160 channel MEG system at the University of Maryland, Feb. 20, 2002.
28. "Scanning SQUID Microscopy and Its Applications", 1 hour, Kanazawa Institute of Technology, Tokyo, Japan, January, 2002.
29. "Thoughts on the Technology Commercialization Process", Inventors Seminar, Office of Technology Commercialization, University of Maryland, October 23, 2001
30. "Scanning SQUID Microscopy of Integrated Circuits", Colloquium, University of Maryland, College Park, September 25, 2001 (1 hour).
31. "Scanning SQUID Microscopy", SQUID 2001, Sept. 2, 2001, Stenungsund, Sweden (20 minutes).
32. "High-Tc SQUID Microscopy of Active Corrosion and Electronic Defects", Quantitative Non-Destructive Evaluation 2001, Bowdoin College, Maine, July 30-August 3, 2001 (40 minutes).
33. "High-Tc SQUID Microscopy for the Non-destructive Testing of Integrated Circuits", F. C. Wellstood, E. Fleet, S. Chatrathorn, S. Y. Lee, and L. Knauss, June 20, 2001, International Superconducting Electronics Conference (ISEC) 2001, Osaka, Japan. (20 minutes).
34. "Scanning SQUID Microscopy", May 7, 2001, Solid State Colloquium, University of California at Berkeley (1 hour).
35. "From the Lab to Industry: Commercialization of the Scanning SQUID Microscope", Georgetown University, Department Colloquium, Sept. 14, 2000. (1 hour)
36. "High-Tc SQUID Microscope for Nondestructive Testing of Electronic Circuits", 13th International Symposium on Superconductivity, Tokyo, Japan, Oct. 16, 2000 (25 minutes).
37. "Magnetic Microscopy Using SQUIDs", Condensed Matter Seminar, University of Houston, February 16, 1999. (1 hour)
38. "Magnetic Microscopy Using SQUIDs", March Meeting of the American Physical Society, March 1998 (20 minutes).

39. "Single electron devices", Foundation and Frontiers of Physics course for beginning Physics grad students, Oct 19, 1998. (1 hour)
40. "Scanning SQUID Measurements of the Pairing Symmetry in YBCO", Gordon Research Conference, Ventura California, Jan. 15, 1997.

2.e.i. Invited talks (continued)

41. "A Simple Near-field Microwave Microscope", Laboratory for Physical Sciences, College Park, Maryland, Feb. 26, 1997.
42. "Magnetic Microscopy Using SQUIDs", Electrical Engineering Department Colloquium, University of Delaware, March 28, 1997.
43. "Magnetic Microscopy Using SQUIDs", F. C. Wellstood, Workshop on Sensitive Magnetometry (Magnetometrie Haute Sensibilite Et Application), Les Houches, France, June 9-13, 1997.
44. "Superconductivity - the Phenomena, the Open Questions and the Prospects", for the Foundation and Frontiers in Physics class at the University of Maryland (internal to the Department), November 17, 1997.
45. "Five Experiments", MRSEC IRG1 symposium (internal to the Department), October 22, 1997.
46. "Magnetic Microscopy Using SQUIDs", Physics Department Colloquium, University of Maryland, Sept. 24, 1996.
47. "Magnetic Microscopy Using SQUIDs", 1996 Applied Superconductivity Conference, Pittsburgh, PA, August 28, 1996.
48. "HTS SQUID Microscopes", ISTEC, Invited talk, Morioka, Japan, June 25, 1996.
49. "Magnetic Microscopy Using Superconducting Sensors", Invited talk, AAAS meeting, Baltimore, February 12, 1996.
50. "Principles and Applications of the Scanning SQUID Microscope", Materials Science Colloquium, University of Virginia, Charlottesville, February 19, 1996.
51. "Magnetic Microscopy Using Superconducting Sensors", Harvard University, Condensed Matter Seminar, Solid State Seminar, December 2, 1995.
52. "Magnetic Microscopy Using Superconducting Sensors", XVIII ENFMC, 18 th National Conference on Condensed Matter Physics, Caxambu, Brazil, June 8, 1995.
53. "Using a Scanning SQUID and Time Reversal Invariance to Determine the Pairing Symmetry of YBCO", XVIII ENFMC, 18th National Conference on Condensed Matter Physics, Caxambu, Brazil, June 9, 1995.
54. "Using a Scanning SQUID and Time-Reversal Invariance to Determine the Pairing Symmetry of YBCO", Solid State Colloquium, Universidade Federal Fluminense, Instituto Fisica, Mitiroa, Brazil, June 13, 1995.
55. "Magnetic Microscopy Using Superconducting Sensors", California Institute of Technology, Solid State Seminar, March 27, 1995.
56. "Using a Scanning SQUID to Determine the Pairing symmetry of YBCO", Stanford Conference on Spectroscopies of Superconductors", Stanford, California, March 1995.
57. "Using Superconducting Sensors for Magnetic Microscopy and Measurements of the Pairing symmetry of YBCO", Solid State Colloquium, Ohio State University, April 11, 1995.
58. "Using Superconducting Sensors to Build a Magnetic Microscope", F. C. Wellstood, class on packaging, Mechanical Engineering Department, University of Maryland, College Park, Maryland (4-18-95).
59. "Magnetic Microscopy Using Superconducting Sensors", Solid State Colloquium, Applied Physics Lab, John Hopkins (10-14-94).

60. "Dissipation in High- T_C Superconductors in the Low-Field Low-Current Limit", F. C. Wellstood, March Meeting of the American Physical Society, Pittsburgh (3-23-94).
61. "Magnetic Microscopy Using Superconducting Sensors", F. C. Wellstood, Introductory Seminar Series, Laboratory for Physical Sciences, College Park, Maryland (2-16-94).

2.e.i. Invited talks (continued)

62. "Magnetic Microscopy Using SQUIDS", Invited talk and paper, F. C. Wellstood, R. C. Black, A. Mathai, Y. Gim, D. Song, A. Amar, E. Danstker, A. H. Miklich, D. T. Nemeth, J. J. Kingston, D. Koelle, F. Ludwig and J. Clarke, Proceedings of the SPIE, Volume 2160, *Superconducting Devices and Circuits*, p118, Jan. 1994.
63. "Magnetic Microscopy Using Superconducting Sensors", F. C. Wellstood, Department of Physics Colloquium, College Park, Maryland (2-15-94).
64. "Magnetic Microscopy Using SQUIDS", Second Workshop for the Center for Atomically Engineered and Nano-Structured Materials, Laboratory for Physical Sciences, College Park, Maryland, (10-15-93).
65. "Magnetic Microscopy Using Superconducting Quantum Interference Devices", Condensed Matter Seminar, University of Chile, Santiago, Chile, (7-4-93).
66. "Magnetic Microscopy Using Superconducting Quantum Interference Devices", IMAG'93, Stockholm, Sweden, (4-14-93).
67. "Magnetic Microscopy Using High- T_C and Low- T_C SQUIDS", Global 93, International Superconductor Applications Convention, San Jose, California (2-3-93).
68. "Thin-film High- T_C Flux Transformers Coupled to SQUIDS", SQUID '91, Berlin, Germany, (6-21-91).
69. "High-Temperature Superconducting Thin-film SQUID Magnetometers", Spring Meeting of the European Materials Research Society, Strasbourg, France, (5-31-91).
70. "Multilayer Structures and Applications to SQUID Magnetometers", March meeting of the American Physical Society, Division of Condensed Matter, (3-18-91 to 3-22-91).
71. "High- T_C Flux Transformers and SQUIDS", Global 91, International Superconductor Applications Convention, San Diego, California (1-15-91).
72. "YBCO Thin-film Coils and Flux Transformers", Solid State Colloquium, University of California, Davis, California (10-25-90).
73. "Vortex Motion and Noise in YBCO Flux Transformers, Condensed Matter Colloquium, Department of Physics, University of Maryland, College Park, (9-6-90).

2.e.ii. Contributed talks

Dr. Wellstood, his students, and collaborators have given many talks at the March meetings of the American Physical Society (APS) and at Applied Superconductivity Conferences (ASC). ASC talks contributed prior to 2009 are listed above under the corresponding refereed papers. For the APS March meeting, contributed talks include: 1 talk in 1987, 3 talks in 1989, 3 talks in 1990, 4 talks in 1991, 1 talk in 1992, 4 talks in 1993, 6 talks in 1994, 4 talks in 1995 (plus two invited talks given by students), about 7 talks in 1998, 4 talks in 2001, etc.

2009, the group gave five talks at the March meeting of the APS:

1. March 2009, meeting of the APS, talk L17.00001 - "Behavior of a Josephson Flux Qubit on a Sapphire Substrate", Anthony Przybysz, E. Crowe, H. Kwon, B.K. Cooper, R.M. Lewis, B.S. Palmer, J.R. Anderson, C.J. Lobb, and F.C. Wellstood.

2. March 2009, meeting of the APS, talk L17.00014 - “Development of a Microwave Resonator for Qubit Read-out”, Zaeill Kim, V. Zaretsky, K. D. Osborn, F. C. Wellstood, and B. S. Palmer.
3. March 2009, meeting of the APS, talk Y34.00012 - “A scanning SQUID microscope for imaging high-frequency magnetic fields”, C. P. Vlahacos, F. C. Wellstood, and J. Matthews.
4. March 2009, meeting of the APS, talk T17.00003 - “Reflectometry measurements of 1/f noise in SQUID phase qubits at mK temperatures”, B. K. Cooper, R. M. Lewis, B. S. Palmer, V. Zaretsky, A. J. Przybysz, H. Kwon, J. R. Anderson, C. J. Lobb, and F. C. Wellstood.
5. March 2009, meeting of the APS, talk T17.00008 - “LC Filtered dc SQUID Phase Qubit with Low Dielectric Loss”, Hyeokshin Kwon, A. J. Przybysz, T. A. Palomaki, Hanhee Paik, K. D. Osborn, R. M. Lewis, B. K. Cooper, J. R. Anderson, C. J. Lobb, and F. C. Wellstood.

2010, Dr. Wellstood, his group, and collaborators gave three talks at the Applied Superconductivity Conference (Washington DC, August 2010) and five posters:

1. “Role of geometry on the color of flux noise in dc SQUIDS”, F. C. Wellstood, C. Urbina and J. Clarke, contributed talk, Appl. Supercond. Conference (2010).
2. “Anomalous Switching Curves in a SQUID phase qubit”, H. Kwon, A.J. Przybysz, B. K. Cooper, H. Paik, K. Osborn, B. S. Palmer, R. Budoyo, J. R. Anderson, C. J. Lobb, F. C. Wellstood, contributed talk, Appl. Supercond. Conference (2010).
3. “Measurements of a cooper-pair box coupled to a quasi-lumped element resonator”, Z. Kim, B. Suri, V. Zaretsky, S. Novikov, K. D. Osborn, F. C. Wellstood, B. S. Palmer, contributed talk, Appl. Supercond. Conference (2010).
4. “A cryo-cooled scanning SQUID microscope for imaging high-frequency magnetic fields”, C. P. Vlahacos, J. Matthews, and F. C. Wellstood, poster presentation, Appl. Supercond. Conference (2010).
5. “Superposition of Inductive and Capacitive Coupling in Superconducting LC Resonators”, Sergiy Gladchenko, Moe Khalil, C. J. Lobb, F. C. Wellstood and Kevin D. Osborn, poster presentation, Appl. Supercond. Conference (2010).
6. “Identifying Sources of Decoherence in a dc SQUID Phase Qubit with a Sub- μm Junction and Interdigitated Capacitor”, Anthony J. Przybysz *Member IEEE*, H. Kwon., R. Budoyo, B. K. Cooper, E. Crowe, A. J. Dragt, J. R. Anderson, C. J. Lobb, and F. C. Wellstood, poster presentation, Appl. Supercond. Conference (2010).
7. “Loss Dependence on Geometry and Applied Power in Superconducting Coplanar Resonators”, Moe S. Khalil, F. C. Wellstood, and Kevin D. Osborn, poster presentation, Appl. Supercond. Conf. (2010).
8. “Deuterated aluminum oxide for superconducting circuits”, K. Osborn, M. Khalil, M. Stoutimore, S. Gladchenko, G. Rubloff, C. Musgrave, F. Wellstood, C. Lobb, poster presentation, Appl. Supercond. Conf. (2010).

In 2010, the group and collaborators gave five talks at the March meeting of the APS:

1. Q15.00005 - “A dual tip STM for superconducting phase-difference detection” Anita Roychowdhury, M. A. Gubrud, D. Sullivan, M. Dreyer, J. R. Anderson, C. J. Lobb, and F. C. Wellstood.
2. T26.00014 - “Anomalous switching curves in a dc SQUID phase qubit”, Hyeokshin Kwon, A. J. Przybysz, B. K. Cooper, J. R. Anderson, C. J. Lobb, F. C. Wellstood, Hanhee Paik, K. D. Osborn, and B. S. Palmer.
3. V26.00007 - “dc SQUID Phase Qubit with Sub-Micron Junction and Interdigitated Capacitor”, Anthony Przybysz, H. Kwon, E. Crowe, B. K. Cooper, R. Budoyo, K. Mitra, J. R.

Anderson, C. J. Lobb, A. J. Dragt, F. C. Wellstood, S. Gladchenko, V. Zaretsky, Z. Kim, B. Palmer, and K. Osborn.

4. X26.00013 - “Quasi-Lumped Element Resonator Coupled to a Cooper-Pair Box”, Zaeill Kim, V. Zaretsky, K. D. Osborn, F. C. Wellstood, and B. S. Palmer.
5. Y26.00012 - “Quality factor dependence on geometry and photon number in superconducting coplanar resonators”, Moe Khalil, M. Stoutimore, H. Paik, F. Wellstood, and K. Osborn.

In 2011:

“Cold Atoms Coupled to a Superconducting Flux Qubit”, Jeffrey Grover; Jonathan Hoffman; Zaeill Kim; Austin Wood; James Anderson; Alex Dragt; Mohammad Hafezi; Christopher Lobb; Luis Orozco; Steven Rolston; Jacob Taylor; Constantine Vlahacos; F. C. Wellstood, 1-6 May 2011, Baltimore, Maryland.

In 2011, the group and collaborators gave twelve talks at the March meeting of the APS:

1. T29.00005 - “Possible interactions between two-level system defects in SiNx films”
Sergiy Gladchenko, Moe Khalil, C.J. Lobb, F.C. Wellstood, Kevin D. Osborn.
2. T29.00006 - “A study of glassy behavior in amorphous dielectrics using GHz frequency superconducting resonators”, Moe Khalil, M.J.A. Stoutimore, Aaron Holder, Charles Musgrave, C.J. Lobb, F.C. Wellstood, K.D. Osborn.
3. B25.00008 - “Tunable High Q Superconducting Microwave Resonator”, Z. Kim, C.P. Vlahacos, J.E. Hoffman, J.A. Grover, B.K. Cooper, J.R. Anderson, A.J. Dragt, C.J. Lobb, L.A. Orozco, S.L. Rolston, J.M. Taylor, F.C. Wellstood.
4. Z29.00006 - “Dielectric loss measurements using an embedded transmission line resonator”, Bahman Sarabi, M.J.A. Stoutimore, Moe Khalil, Sergiy Gladchenko, Alexander Kozen, Gary Rubloff, F.C. Wellstood, C.J. Lobb, K.D. Osborn.
5. B27.00014 - “Quantum State Tomography of a Cooper-pair Box”, Sergey Novikov, V. Zaretsky, B. Suri, Z. Kim, B.S. Palmer, F.C. Wellstood.
6. Y29.00008 - “Dephasing Measurements of a Cooper-pair box”, Vitaley Zaretsky, S. Novikov, B. Suri, Z. Kim, F. C. Wellstood, B. S. Palmer.
7. P29.00008 - “Two junction effects in dc SQUID phase qubit”, B.K. Cooper, H. Kwon, A.J. Przybysz, R. Budoyo, .R. Anderson, C.J. Lobb, F.C. Wellstood.
8. K1.00138 - “Observation of 0.2 ms Lifetime in a Cooper-pair Box”, Z. Kim, B. Suri, V. Zaretsky, S. Novikov, K. Osborn, A. Mizel, F. Wellstood, B. Palmer.
9. A21.00002 - “A Dual Tip STM for Imaging the Superconducting Phase Difference”, Anita Roychowdhury, M.A. Gubrud, Dan Sullivan, Michael Dreyer, J.R. Anderson, C.J. Lobb, F.C. Wellstood.
10. P25.00004 - “Dependence of low frequency flux noise on SQUID-washer dimensions”, J. Birenbaum, S.M. Anton, A.D. Fefferman, S.R. O'Kelley, J. Clarke, H-M Cho, .C. Hilton, K.D. Irwin, F.C. Wellstood.
11. P29.00007 - “Design of a dc SQUID Phase Qubit with Controlled Coupling to the Microwave Signal”, R.P. Budoyo, A.J. Przybysz, B.K. Cooper, H. Kwon, Z. Kim, B. Cheng, A.J. Dragt, J.R. Anderson, C.J. Lobb, F.C. Wellstood, M. Khalil, S. Gladchenko, M. Stoutimore, B.S. Palmer, K.D. Osborn.
12. Y29.00007 - “Strong frequency dependence of coupling of a Cooper- pair box qubit to Quantum Noise”, B. Suri, Z. Kim, V. Zaretsky, S. Novikov, K.D. Osborn, A. Mizel, B.S. Palmer, F.C. Wellstood.

In 2012: the group and collaborators gave 3 talks and 5 posters at the Applied Superconductivity Conference:

1. 5EC-03 (oral) - "Flux Coupling of a Cooper-pair Box to a Superconducting Resonator", B. Suri, V. Zaretsky, S. Novikov, F.C. Wellstood, B.S. Palmer.
2. 3EPA-03 - "Geometry and temperature dependence of low frequency flux noise in dc SQUIDs", S.M. Anton, J.S. Birenbaum, S.R. O'Kelley, D.S. Golubev, G.C. Hilton, H.M. Cho, K.D. Irwin, V. Bolkhovskiy, D.A. Braje, G. Fitch, M. Neeley, W.D. Oliver, F.C. Wellstood, J. Clarke.
3. 3EPN-05 - "Calculation of 3D current distributions from scanning SQUID microscope images", A.D.E. Jeffers, F.C. Wellstood, H. Kwon, B. Cheng, A. Orozco, F. Cawthorne, C. Rowlett, S. Garrahan, V. Talanov.
4. 4EH-07 (oral) - "Loss analysis of linear superconducting resonators with different dielectric volumes", B. Sarabi, M.J.A. Stoutimore, M.S. Khalil, F.C. Wellstood, K.D. Osborn.
5. 4EPB-05 - "A novel analysis method for asymmetric resonator transmission applied to superconducting devices", M. S. Khalil, M.J.A. Stoutimore, F.C. Wellstood, K.D. Osborn.
6. 4EPB-07 - "Probing Discrete Two-Level Systems Coupled to a Tunable High Q Superconducting Microwave Resonator", K. Voigt, Z. Kim, J. Hoffman, J. Grover, J. Lee, S. Ravets, V. Zaretsky, B. Palmer, M. Hafezi, J. Taylor, J. Anderson, C. Lobb, L. Orozco, S. Rolston, F. Wellstood.
7. 4EPC-07 - "A dc SQUID Phase Qubit with Controlled Coupling to the Microwave Line", R.P. Budoyo, B.K. Cooper, C.J. Ballard, J.R. Anderson, C.J. Lobb, F.C. Wellstood.
8. 4JE-03 (oral) - "A Dual Tip STM for Imaging the Gauge Invariant Phase on Superconductors", A. Roychowdhury, M.A. Gubrud, M. Dreyer, J.R. Anderson, C.J. Lobb, F.C. Wellstood.

In 2012, the group and collaborators gave the following talks at the March meeting of the APS:

1. W29.00007 - "Dielectric loss analysis using linear resonators with different impedances"
2. K1.00261 - "Atoms talking to SQUIDs"
3. Z29.00004 - "Pure dephasing in flux qubits due to flux noise with spectral density scaling as $1/f^\alpha$ "
4. Q30.00003 - "A dc SQUID Phase Qubit with Controlled Coupling to the Microwave Line"
5. A4.00005 - "Tunable High Q Superconducting Microwave Resonator for Hybrid System with ^{87}Rb atoms"
6. Q30.00009 - "Transmon qubit coupled to a quasi-lumped element resonator"
7. V29.00009 - "Relaxation of a Cooper-Pair Box Coupled to Discrete Charge Fluctuators"
8. L54.00010 - "Geometry and temperature dependence of low frequency flux noise in dc SQUIDs"
9. X1.00005 - "A Dual Tip STM for Imaging the Superconducting Phase Difference"
10. L39.00010 - "3D Microwave Cavity for Qubit Measurement"
11. V29.00007 - "Two-level system dynamics in amorphous dielectrics probed with a dc electric field"

In 2013, the group and collaborators gave the following talks at the March meeting of the APS:

1. N41.00007 - "Development of a hybrid quantum system employing a tunable high-Q superconducting microwave resonator and trapped laser-cooled atoms", J. Hertzberg, K. Voigt, Z. Kim, J. Hoffman, J. Grover, J. Lee, S. Ravets, M. Hafezi, J. Taylor, A.

- Choudhary, J. Anderson, C. Lobb, L. Orozco, S. Rolston, F. Wellstood, March meeting of the APS, 2013.
2. N41.00009 - “Discrete Two-Level Systems Coupled to a Tunable High Q Superconducting Microwave Resonator”, Kristen Voigt, J. Hertzberg, Z. Kim, J. Hoffman, J. Grover, J. Lee, S. Ravets, M. Hafezi, J. Taylor, A. Choudhary, J. Anderson, C. Lobb, L. Orozco, S. Rolston, F. Wellstood, March meeting of the APS, 2013.
 3. T25.00010 - “Towards Tunable Transitions in 2-D Transmons”, Z. K. Keane, B. Suri, S. Novikov, J. E. Robinson, F. C. Wellstood, B.S. Palmer, March meeting of the APS, 2013.
 4. T46.00001 - “A Josephson STM with two niobium tips”, Anita Roychowdhury, Rami Dana, M. Dreyer, J. R. Anderson, C. J. Lobb, F. C. Wellstood, March meeting of the APS, 2013.
 5. U25.00006 - “Probing Electromagnetically Induced Transparency in a Transmon”, Sergey Novikov, J.E. Robinson, Z.K. Keane, B. Suri, F. C. Wellstood, B.S. Palmer, March meeting of the APS, 2013.
 6. M36.00008 - “Geometry and temperature dependence of low-frequency flux noise in dc SQUIDs”, S.M. Anton, J.S. Birenbaum, S.R. O’Kelley, D.S. Golubev, G.C. Hilton, H.-M. Cho, K.D. Irwin, V. Bolkhovskiy, D.A. Braje, G. Fitch, M. Neeley, R.C. Johnson, W.D. Oliver, F.C. Wellstood, John Clarke, March meeting of the APS, 2013.
 7. T25.00007 - “rf Photon Peaks of a dc SQUID Phase Qubit Coupled to On-Chip LC Filter”, R.P. Budoyo, B.K. Cooper, V. Zaretsky, C. J. Ballard, J.R. Anderson, C.J. Lobb, F.C. Wellstood, March meeting of the APS, 2013.
 8. T25.00006 - “Extracting an Effective Jaynes-Cummings Model for an LC Filtered dc SQUID”, B.K. Cooper, R.P. Budoyo, V. Zaretsky, C.J. Ballard, J.R. Anderson, C. J. Lobb, F.C. Wellstood, March meeting of the APS, 2013.
 9. B25.00010 - “Non-equilibrium two-level system dynamics probed with a biased bridge resonator”, Moe S. Khalil, Sergiy Gladchenko, M.J.A. Stoutimore, F.C. Wellstood, K.D. Osborn, March meeting of the APS, 2013.
 10. U25.00005 - “Requirements for Electromagnetically Induced Transparency in a Transmon”, J.E. Robinson, S. Novikov, Z.K. Keane, B. Suri, F.C. Wellstood, B.S. Palmer, March meeting of the APS, 2013.
 11. N41.00006 - “Atomic manipulation for a hybrid system: tapered optical fibers with high transmission and a pyramid MOT”, J.E. Hoffman, J. A. Grover, M. Hafezi, J.B. Hertzberg, P. Kordell, J. Lee, S. Ravets, U. Chukwu, K. D. Voigt, J.R. Anderson, G. Beadie, F.K. Fatemi, C.J. Lobb, L.A. Orozco, J.M. Taylor, S.L. Rolston, F.C. Wellstood, March meeting of the APS, 2013.

2015.

Group contributed talks at the APS March Meeting in 2015, Monday–Friday, March 2–6, 2015; San Antonio, Texas, Bulletin of the American Physical Society, Volume 60, Number 1.

1. A21.00011, “Connecting the Tips of a Millikelvin Dual-Tip STM”, Wan-Ting Liao, Michael Dreyer, Christopher Lobb, Frederick Wellstood, J. Robert Anderson.
2. B39.00014, “Spectroscopy of Nanoscale Two-Level Systems in Insulating Films”, Bahman Sarabi, Aruna Ramanayaka, Frederick Wellstood, Kevin Osborn
3. B39.00005, “Influence of Non-equilibrium Noise on Quantum Superconducting Devices”, Jay Lefebvre, Baladitya Suri, Sergey Novikov, Frederick Wellstood, Benjamin Palmer
4. M41.00005, “Electromagnetically induced transparency and coherent population trapping with a superconducting artificial atom”, Sergey Novikov, Timothy M. Sweeney, J.E. Robinson, Baladitya Suri, F.C. Wellstood, B.S. Palmer.

5. M41.00006, “Electromagnetically Induced Superluminal Light in a 3D Transmon Device”, Timothy M. Sweeney, Sergey Novikov, Baladitya Suri, Shavindra Premarante, Jen-Hao Yeh, F.C. Wellstood, B.S. Palmer.
6. S39.00010, “Effects of 780 nm Optical Illumination on Loss in Superconducting Microwave Resonator”, R.P. Budoyo, J.B. Hertzberg, C.J. Ballard, K.D. Voigt, J.E. Hoffman, J.A. Grover, P. Solano, J. Lee, S.L. Rolston, L.A. Orozco, J.R. Anderson, C.J. Lobb, F.C. Wellstood
7. S39.00011, “Position-Dependent Optical Response of a Superconducting Resonator at 15 mK”, K. D. Voigt, J. B. Hertzberg, J. E. Hoffman, J. A. Grover, J. Lee, P. Solano, R. P. Budoyo, C. Ballard, J. R. Anderson, C. J. Lobb, L. A. Orozco, S. L. Rolston, F. C. Wellstood
8. S39.00013, “Energy relaxation in transmons coupled to superconducting lumped-element resonators”, B. Suri, S. Novikov, F.C. Wellstood, B.S. Palmer.
9. W39.00012, “Design of a Tunable 3D Microwave Cavity for Use in Coupling to Quantum Superconducting Circuits”, C.J. Ballard, R.P. Budoyo, K.D. Voigt, J.B. Hertzberg, J.R. Anderson, C.J. Lobb, F.C. Wellstood.

2016.

Members of the group contributed talks at the APS March Meeting in 2016, Monday–Friday, March 14–18, 2016; Baltimore, Maryland, Bulletin of the American Physical Society.

1. P48.00015, “Fock State Generator”, Shavindra Premaratne, F.C. Wellstood, B.S. Palmer, <http://meetings.aps.org/link/BAPS.2016.MAR.P48.15>
2. F48.00014, “Design and Measurement of a Tunable Thin-Film LC Resonator for Coupling to Superconducting Circuits”, C. J. Ballard, R. P. Budoyo, K. D. Voigt, S. K. Dutta, C. J. Lobb, F. C. Wellstood, <http://meetings.aps.org/link/BAPS.2016.MAR.F48.14>
3. K45.00003, “Optical-Fiber-Illuminated Response of a Superconducting Microwave Resonator Below 1 K”, Kristen Voigt, J. B. Hertzberg, S. K. Dutta, J. E. Hoffman, J. A. Grover, J. Lee, P. Solano, R. P. Budoyo, C. Ballard, J. R. Anderson, C. J. Lobb, S. L. Rolston, F. C. Wellstood, <http://meetings.aps.org/link/BAPS.2016.MAR.K45.3>
4. V23.00014, “Josephson STM at mK temperatures: Coupling to the electronic environment”, Michael Dreyer, Rami Dana, Wan-Ting Liao, Chris Lobb, Fred Wellstood, Bob Anderson, <http://meetings.aps.org/link/BAPS.2016.MAR.V23.14>
5. A46.00007, “How to simultaneously scan connected tips in a dual-tip STM”, Wan-Ting Liao, Michael Dreyer, James Anderson, Christopher Lobb, Frederick Wellstood, <http://meetings.aps.org/link/BAPS.2016.MAR.A46.7>
6. P19.00006, “Effects of transverse fields on spin-valve sensor magnetic field measurements”, Alex Jeffers, Antonio Orozco, Alfred Cawthorne, Christopher Rowlett, Steve Garrahan, Frederick Wellstood. <http://meetings.aps.org/link/BAPS.2016.MAR.P19.6>
7. Y48.00001, “Design and Simulation of Microwave Attenuators for Superconducting Quantum Devices”, Jay LeFebvre, Jen-Hao Yeh, Frederick Wellstood, Benjamin Palmer, <http://meetings.aps.org/link/BAPS.2016.MAR.Y48.1>
8. Y48.00002, “Cavity Dephasing in Transmon Qubits from Non-equilibrium Noise”, Jen-Hao Yeh, Jay Lefebvre, Frederick Wellstood, Benjamin Palmer, <http://meetings.aps.org/link/BAPS.2016.MAR.Y48.2>

2017:

March meeting of the APS

LT: A-896-0003-00227 entitled "Microwave Attenuator for Reducing Photon Dephasing in Superconducting Qubits below 100 mK" has been accepted for the 28th International Conference on Low Temperature Physics, August 9-16, 2017, Gothenburg, Sweden.

2.e.iii. Unrefereed Conference Proceedings

1. "Investigation of Low-Frequency Excess Noise in Nb-Al₂O₃-Nb Josephson Tunnel Junctions", B. Savo, F. C. Wellstood, and J. Clarke, Second Soviet-Italian Symposium on Weak Superconductivity, Napoli (1987), ed. Barone and Larkin, World Scientific Publishing.
2. "Magnetic Microscopy Using SQUIDs", F. C. Wellstood, R. C. Black, A. Mathai, Y. Gim, D. Song, A. Amar, E. Danstker, A. H. Miklich, D. T. Nemeth, J. J. Kingston, D. Koelle, F. Ludwig and J. Clarke, Proceedings of the SPIE, Volume 2160, *Superconducting Devices and Circuits*, p118, Jan. 1994.
3. "Magnetic Microscopy Using SQUIDs", F. C. Wellstood, Extended Abstracts for workshop on Sensitive Magnetometry (Magnetometrie Haute Sensibilite Et Application), Les Houches, France, June 9-13, 1997, p. L23.
4. "High-Tc SQUID Microscopy for the Non-destructive Testing of Integrated Circuits", F. C. Wellstood, E. Fleet, S. Chatrathorn, S. Y. Lee, and L. Knauss, extended abstract of ISEC 2001, Osaka, Japan.

2.f Films, Tapes, Photographs, etc

none

2.g Exhibits, Performances, Demonstrations, and Other Creative Activities

none

2.h. Original Designs, Plans, Patents, and Inventions

Patents have been received for high temperature superconducting microelectronic contacts, crossovers, coils, and flux transformers for work done while at the University of California..

US Patent Number 5,491,411

Wellstood, Mathai, Song, Black, "Method and Apparatus for Imaging Microscopic Spatial Variations in Small Currents and Magnetic Fields", February 13, 1996.

US Patent Number 5,894,220

Wellstood, Gim, Black, Green, "Apparatus for Imaging Electrical and Magnetic Properties of Room-Temperature Objects", April 13, 1999.

US Patent Number 5,900,618

Anlage, Wellstood, Vlahacos, Steinhauer, "Near-Field Scanning Microwave Microscope Having a Transmission Line with an Open End", May 4, 1999.

US Patent Number 6984977

Scanning SQUID Microscope with Improved Spatial Resolution, Chatrathorn, Fleet, and Wellstood, 01/10/2006

US patent Number 6,516,281

Wellstood, Kenyon and Lobb, "Single Electron Transistor Microscope for Imaging Ambient Temperature Objects", Feb 4, 2003.

US patent Number #**6,809,533**

"Quantitative imaging of dielectric permittivity and tenability, With Anlage, Vlahacos, et al.

US patent Number #**7,085,656**

"Method for suppressing edge artifacts in magnetic microscopy", August 1, 2006, Claudio Felipe Busko, John Matthews, Fred Wellstood.

US patent Number #**7,106,057**

"High frequency scanning Squid microscope and method of measuring high frequency magnetic fields", Sept 12, 2006, John Matthews, Fred Wellstood, Soun Pil Kwon.

US patent Number #**7,268,542**

"Scanning SQUID Microscope Having Position Noise Compensation", Sept 11, 2007, John Matthews and Fred Wellstood.

2.i. Contracts and Grants

Sloan Foundation Fellowship, September 1992 to September 1994, \$30 k.

"Magnetic Microscopy Using Superconducting Quantum Interference Devices", NSF grant number DMR-9218373, 5-95 to 10-96, \$210 k.

"Acquisition of a UNV Sputtering System for Superconductor Research", NSF infrastructure grant DMR-9214579, PI is Steve Anlage, co-PIs are C. J. Lobb and F. Wellstood, \$155 k, 1993-1994.

Phase I SBIR subcontract from Quantum Magnetics, Inc., for SQUID-based NDE of aircraft wings, \$12 k, 5-93 to 11-93.

"Collaboration on Single Electron Transistors", joint with Professor Chris Lobb, 4-94 to 9-98, \$24 k per year.

"Superconducting Quantum Interference Devices for Gravity Wave Detection", NSF grant number PHY-9306982, 12-93 to 5-97, \$301 k.

Phase I SBIR subcontract from Neocera, Inc., for the development of a commercial room-temperature scanning SQUID microscope, 9-94 to 3-95, \$30 k.

"Imaging Microwave Frequency Currents in Operating Devices on Sub-nanosecond Time Scales and Micron Length Scales", grant number ECS-9632811, PI is Steve Anlage, co-PI is F. Wellstood, 7-96 to 7-99, \$315k.

Phase II SBIR subcontract from Neocera, Inc. for the development of a commercial room-temperature scanning SQUID microscope, began about 10-96, ending 10-98, about \$200k.

NSF MRSEC grant, Director is Prof. E. Williams, Wellstood was Co-PI with 19 other faculty members, approximately \$1.6M/year (August 1996 to September 1999).

Subcontract from Neocera, Inc (PAF-Sematech) for the development of a high-resolution scanning SQUID microscope, 12-98 to 12-99, about \$30k.

MIPS contract for installation and training for a commercial room-temperature scanning SQUID microscope, 2-99 to 2-00, about \$75k.

“Electric Field Microscopy of Computer Chips Using a Scanning Single Electron Transistor”, with C. J. Lobb, NSF GOALI award, 6/99-6/02, \$291k.

“Quantum Computing with Superconducting Devices”, with Anderson, Dragt and Lobb, DOD, 7/99 – 9/03, \$1.93 M.

“Non-Destructive Evaluation of Defects in Wires and other samples using an 8-channel high T_c Scanning SQUID”, DOD, 8/00-12/31/02, \$120k.

Subcontract from Neocera, Inc., for the development of a high-speed scanning SQUID microscope, 12-98 to 12-99, about \$30k.

Phase 2 Subcontract from Neocera, Inc., for the development of a high-speed scanning SQUID microscope, 6-01 to 6-02, about \$35k.

MIPS contract for the development of improved imaging techniques for the scanning SQUID microscope, 8-02 to 8-03, about \$100k.

“Development of a Flow-through SQUID system and Completion of a hand-held SQUID system”, AFOSR, 2/02-2/04, \$200k.

“Quantum Computing with Superconducting Devices - II”, with Anderson, Dragt and Lobb, DOD, 10/03 – 9/07, about \$1.40 M.

“Flow-through SQUID system for NDE of Superconducting Wire”, AFOSR, 2/04-2/06, \$100k.

"Imaging the Gauge Invariant Phase of a Superconductor on the Atomic Scale", with Wellstood, Anderson, and Lobb, NSF, 5/06-6/11, \$360 k.

"Phase 0 proposal on quantum information Science and Technology", Northrop Grumman Corporation, with Wellstood, Anderson, and Lobb, 3/06 - 9/06, \$100k

"Magnetic imaging using a fine magnetizable fiber", with L. Knauss, A. Orozco, and F. Wellstood, NSF subcontract from Neocera, 1/07 to 12/07, \$50 k

“Quantum Computing with Phase Qubits”, with Anderson, Dragt and Lobb, DOD, 2008 – 2012, about \$1.40 M.

"Magnetic Field Imaging for Stacked Chip 3D Fault Isolation", with A. Orozco (Neocera) and F. Wellstood, IARPA subcontract from Neocera, 12/2010 to 12/2014, approx. \$200k to \$230k/year

"Tunable Coupling Networks with Good On-Off Ratios for Superconducting Qubits", LPS contract, 10/1/2014 to 9/30/2018, approx. \$300 k/year, F. C. Wellstood and C. J. Lobb

"Atomic Resolution Dual-Point Superconducting Phase STM", Sponsor: NSF, Role: Lead Investigator, Award Start Date: 2014-09-01, Award End, 2016-08-31, F. C. Wellstood and C. J. Lobb, approx. \$150 k

"Funding for a Workshop on Decoherence Mechanisms in Superconducting Qubits", ARO, approx. \$6000, the workshop was held in June 2016,

Research Advisor for Dr. Bahman Sarabi, Intelligence Community Postdoctoral Fellowship. Oak Ridge Institute for Science and Education, approx. \$7000, Oct 2016 to Oct 2018.

2.j. Fellowships, Prizes and Awards:

- (1) Fellow of the American Physical Society (since 2003).
- (2) The 2001 Richard A. Ferrell Distinguished Faculty Fellowship. Presented by the Department of Physics, University of Maryland, September 20, 2001.
- (3) Award (with L. Knauss et al.) from the Electronic Device Failure Analysis Society for the best paper at the 26th International Symposium for Testing and Failure Analysis, 12-16 Nov. 1999, Bellevue, Washington, for our paper entitled "Detecting Power Shorts from Front and Backside of IC Packages Using Scanning SQUID Microscopy", L. A. Knauss, B. M. Frazier, H. M. Christen, S. D. Silliman, K. S. Harshavardhan, E. F. Fleet, F. C. Wellstood, M. Mahnapour, and A. Ghaemmaghami.
- (4) R&D 100 award from R&D 100 Award by R&D Magazine, for the invention of the Magma-C1 scanning SQUID microscope, with L. Knauss et al. at Neocera Inc.
- (5) Award for Outstanding Invention of 1998, presented by the Office of Technology Liaison, University of Maryland, College Park (April 15, 1999)
- (6) Award for Outstanding Invention of 1992, presented by the Office of Technology Liaison, University of Maryland, College Park (April 22, 1993)
- (7) Sloan Foundation Fellow (Sept. 1992 - Sept 1994)
- (8) Certificate of Merit, for outstanding efforts in technology transfer, Lawrence Berkeley Laboratory (1991).
- (9) IBM Pre-Doctoral Fellowship (September 1987 to June 1988).
- (10) Faculty Associate Award for excellence in teaching (June 1982).
- (11) Bachelor degree was awarded with great distinction in general scholarship (December 1979).

2.k. Editorships, Editorial Boards, and Reviewing Activities for Journals and Other Learned Publications

Refereed for Physical Review Letters, Applied Physics Letters, IEEE Transactions on Applied Superconductivity, Journal of Applied Physics, Review of Scientific Instruments, and various conferences on superconductivity.

2.l. other

Fellow of the American Physical Society.

3. Teaching and Advising

3.a. Courses taught

3.a.i General

Physics 107 - Physics of Light Lab

(Spring 2001) - approximately 17 students in the section I taught, and about 100 total

(Fall 2001) - about 140 students

(Fall 2002) - about 100 students total

(Spring 2013) - about 40 students total

Physics 161 - General Physics: Mechanics and Particle Dynamics

(Fall 1996) - approximately 50 students

(Spring 1998) - approximately 150 students

(Spring 1999) - approximately 150 students

(Fall 2004) - approximately 150 students

(Fall 2008) - approximately 90 students

(Fall 2009) - approximately 66 students

(Fall 2010) - approximately 80 students

Physics 170 – Professional Physics Seminar

(Fall 2000) – 11 students

Physics 171H Honors section of Freshman Physics - (Fall 1997) (the main instructor was Ellen Williams, Wellstood handled the honors discussion section) - about 14 students.

Physics 174- Introductory Physics Lab –

(Fall 1997) (co-teaching with Professor Goodman) approximately 32 students,

(Fall 1998) (co-teaching with Professor Anderson) approximately 50 students.

(Spring 2002) (co-teaching with Professor Williams) approximately 40 students total.

(Spring 2003) (co-teaching with Professor Lobb) approximately 40 students total.

(Fall 2006) 1 section, approximately 8 students.

Physics 260/260H – Physics for Engineers II

(Fall 2003) - 144 students

(Fall 2005) - 120 students

(Spring 2009) - approximately 65 students

(Spring 2010) - approximately 77 students

(Spring 2011) - approximately 70 students

(Fall 2014) - approximately 220 students

Physics 261 – Physics for Engineers II - Lab for Physics 260

(Fall 2011) - approximately 500 students

(Spring 2014) - worked on revisions of Physics 261

(Spring 2016) - approximately 300 students

Physics 262A - Lab for Physics 262 - General Physics: Vibrations, Waves, Heat, Electricity and Magnetism (this became Physics 261)

Fall 1994, Spring 1995, Fall 1995, approximately 250-150 students per semester (co-taught with Professor Jordan Goodman), Spring 1997 (co-taught with Professor Hassan Jawahery)

Physics 263A - Lab for Physics 263 - General Physics: Electrodynamics, Light, Relativity and Modern Physics (this became physics 262)

Fall 1994, Spring 1995, Fall 1995, approximately 150-250 students per semester (co-taught with Professor Jordan Goodman), Spring 1997 (co-taught with Professor Hassan Jawahery)

Physics 271 – Physics for Engineers III - Lab for Physics 270

(Fall 2011) - approximately 300 students

(Spring 2014) - worked on revisions of Physics 271

(Spring 2016) - approximately 500 students

Physics 275 - Experimental Physics 1

(Fall 99) approximately 10 students

(Spring 2000) 10 students

(Fall 2000) 18 students

(Fall 2001) 6 students

(Spring 2004) – 20 students (co-taught with Dr. Greene who runs two other sections)

(Spring 2005) – 20 students (co-taught with Dr. Greene who runs two other sections)

(Spring 2006) – about 20 students (co-taught with Dr. Greene who runs two other sections)

(Spring 2007) – 20 students (co-taught with Dr. Greene who runs two other sections)

(Fall 2007) – about 18 students (co-taught with Dr. Lobb who runs two other sections)

(Spring 2008) – 18 students (co-taught with Dr. Greene who runs two other sections)

(Spring 2012) – 26 students (co-taught with Dr. Hamilton who runs 2 other sections)

(Fall 2012) – about 20 students (co-taught with Dr. Ouyang who ran 2 other sections)

(Fall 2013) – about 15 students (co-taught with Dr. Ouyang who ran 2 other sections)

(Spring 2015) – about 20 students (co-taught with Dr. Ouyang who ran 2 other sections)

(Spring 2017) -- 26 students (co-taught with Dr. Baden who ran two other sections)

Physics 276 - Experimental Physics 2 - Electricity and Magnetism

(Fall 2006) approximately 8 students

(Fall 2015) 20 students

(Fall 2016) 24 students

Physics 375 - Optics Lab

(Spring 2013) 10 students (with Dr. Shawhan who ran two other sections)

Physics 420 - Principles of Modern Physics, (Spring 1996) - approximately 20 students

Physics 431 - Principles of Matter, (Fall 1992), approximately 10 students

(Fall 1993), approximately 5 students

3.a.ii Specialized

none

3.a.iii General Honors

none

3.a.iv Independent Study, Tutorial, Internship Supervision

Physics 899 since fall 1991, Physics 799 for two masters students during last few years

3.b. Course or Curriculum Development

(i) Worked with Professor Jordan Goodman to rebuild Physics 262A and Physics 263A. These are introductory physics lab courses for engineers. Work included completely rewriting the lab manuals, introducing new experiments, introducing personal computers into the lab, introducing spreadsheet analysis and computerized data plotting, increasing the emphasis on error analysis, shortening the time spent on writing up lab reports, creating office hours in labs, increasing TA training. During Fall 1997, Dr. Wellstood worked with Professor Goodman on developing the first written lab manual for Physics 174, the introductory physics lab for physics majors and prepared a revised version of the manual in January 99.

(ii) During the Summer and Fall of 1999, I worked with Derek Boyd on a major revision to the Physics 275 lab. Among other things, we introduced two in-class practical examinations, developed 6 new experiments, brought in the use of force probes and sonic rangers, integrated spreadsheets into the course, and wrote a complete new lab manual. In Spring 2000, I did some comparatively minor revisions on the labs to iron out the bugs found during the first run-through the previous Fall. Dr. Greene and I completed an additional revision of the manual in Summer 2007.

(iii) As part of my job as Associate Chair, during the year I also worked with Chris Lobb, Ted Einstein and Robert Hudson to develop a new Meteorology Physics Area of Concentration that allows students to get a B.S. in Physics with a specialization in Meteorology. This additional track, the first new track in the Department's history, was approved by the University in Fall 2000. With help from Chris Lobb, David Hammer, and Jordan Goodman and assistance from Scott Wolpert (CMPS Associate Dean) and the College of Education, I also put together an Education Physics Area of Concentration which was approved in Spring 2001.

(iv) Spring 2013 - working on a revision of Physics 375 with Peter Shawhan

(v) Spring 2014 - working on revisions of Physics 261 and Physics 271 Labs with Allen Monroe, Bill Norwood, and Dr. Steve Cowen. We are updating experiments, revising the lab manuals, creating spreadsheet templates for collecting and analyzing data, expanding the number of setups, developing software to provide automatic feedback to the students while they are collecting and analyzing their data, and developing software to aid the teaching assistants in grading lab reports.

3.c. Manuals, Notes, and Other Contributions to Teaching

Starting in summer 2015, I began a major effort to convert all of the Physics Department's lab manuals to electronic form (PDFs) that are distributed on-line via Expert TA. As of March 2017, I have completed Physics 103, 107, 121, 122, 174, 261, 271, 275, 276, 375 and 405. The only remaining manuals are Phys 115, 131 and 132. This process has involved finding the company, helping to negotiate a long-term arrangement, developing prelab or homework questions for each lab that can be automatically graded, correcting mistakes and typos, improving the graphics, rewriting and proofreading as well as updating the experiments.

"Physics 275 Laboratory Manual", Summer 2008 revised edition, F. C. Wellstood and R. Greene, published and printed by the Department of Physics, University of Maryland.

"Physics 275 Laboratory Manual", Summer 2007 revised edition, F. C. Wellstood and R. Greene, published and printed by the Department of Physics, University of Maryland.

"Physics 174 Laboratory Manual", Fall 1997 and Spring 99 revised editions, F. C. Wellstood and J. Goodman, published and printed by the Department of Physics, University of Maryland.

"Physics 262A Laboratory Manual", Spring 1994 and Fall 1995 revised editions, F. C. Wellstood and J. Goodman, published and printed by the Department of Physics, University of Maryland.

"Physics 263A Laboratory Manual", Spring 1994, Fall 1995, and Spring 1997 revised editions, F. C. Wellstood and J. Goodman, published and printed by the Department of Physics, University of Maryland.

3.d. Teaching Awards

none

3.e. Advising (other than Research Direction)

3.e.i Undergraduates

Advising physics undergraduates 1995-1999, about 3 students per year

3.e.iii Other

none

3.f. Advising (Research Direction)

i. Undergraduate

Jan Gaudestad (finished May 2000)

ii. Masters

C. P. Vlahacos (finished 1999)

J. Gaudestad (finished 2001)

iii. Doctoral

1. Randall C. Black (finished August 1995)

2. Anna Mathai (finished September 1995)

3. Yonggyu Gim (finished August 1996)

4. Dian Song (finished Spring 1997)

5. Insik Jin (finished summer 1997)

6. Erin Fleet (finished Aug. 2000)

7. Sojiphong Chatraphorn (finished Dec 2000)

8. Ashfaq Thanwalla (finished Dec. 2000)

9. Matt Kenyon (co-advised with C. J. Lobb, finished summer 2001)

10. John Matthews (co-advised with Marvin Cage, finished 2002)

11. Soun Pil Kwon (finished 2003)

12. Su-Young Lee (started Jan. 2000, finished spring 2004)

13. Huizhong Xu (co-advised with Anderson and Lobb, started fall 2000, finished fall 2004)

14. Sudeep Dutta (co-advised with Anderson and Lobb, finished Dec 2006)

15. Carlos Sanchez (co-advised with Ben Palmer, finished Dec. 2005)

16. Hanhee Paik (co-advised with Chris Lobb, finished Aug 2007).

17. Tauno Palomaki (co-advised with Anderson and Lobb, started Jan 2005, finished 2008)
18. Constantine Vlahacos (EE, started Jan 2006, finished Nov. 2009)
19. Zaeill Kim (Co-advised with Dr. B. Palmer at LPS, started Jan 2007, finished Aug 2010)
20. Anthony Przybysz (co-advised with J. R. Anderson and Chris Lobb, finished Dec 2010)
21. Hyeokshin Kwon (co-advised with J. R. Anderson and Chris Lobb, finished Dec. 2010)
22. Oliver Oberg (co-advised with Anna Herr, finished Dec 2011).
23. Vitaley Zaretsky (co-advised with Dr. B. Palmer, start Sept 2007, finished June 2013)
24. Benjamin Cooper (co-advised with Anderson & Lobb, start Sept. 2005, finished Dec '13)
25. Moe Khalil (Co-advised with Kevin Osborn at LPS, started Sept 2008, finished Dec '13)
26. A. Roychowdhury (with C. Lobb (advisor), M. Dreyer and J. R. Anderson, finished June 30, 2014)
27. Bahman Sarabi (Co-advised with Kevin Osborn at LPS, start Sept 2008, finished Oct '14)
28. Rangga Budoyo (co-advised with J. R. Anderson and Chris Lobb, started Jan 2009, finished 11/4/2015)
29. Baladitya Suri (Co-advised with Dr. B. Palmer, started Jan 2010 finished Feb 2015)
30. Sergey Novikov (Co-advised with Dr. Benjamin Palmer at LPS, started Jan 2010 finished June 2015)
31. Alex Jeffers (started May 2011, finished Dec. 2016)
32. *Kristen Voigt (co-advised with Chris Lobb started Jan. 2011)*
33. *Cody Ballard (o-advised with Chris Lobb, entered MD and started in lab Sept 2011)*
34. *Shavindra Premaratne (Co-advised with Dr. Benjamin Palmer at LPS, started Sept 2014)*
35. *Wan-ting Liao (Co-advised with Dr. M. Dreyer and Chris Lobb, started June 2014)*
36. *Rui Zhang (Co-advised with Dr. Benjamin Palmer at LPS, started Jan 2015)*
37. *Henry Luo, started (in EE, working with Oliver Oberg and Anna Herr at Northrup-Grumman, started March 2017)*

3.g. Extension Activities

none

4. Service

4.a. Professional

4.a.i. Offices and Committee Memberships held in professional organizations

Member of the Program Committee of the Electronics section of the 1998 Applied Superconductivity Conference.

Co-chair of the Program Committee (with S. Anlage and C. Lobb) for the Electronics section of the year 2000 Applied Superconductivity Conference.

Ex-officio member of the executive board of the Applied Superconductivity Conference, Sept. 98 to Sept. 2000.

One of several technical editors for the year 2006 Applied Superconductivity Conference.

Co-chair of the Program Committee (with O. Mukanov and D. Van Vechten) for the Electronics section of the year 2004 Applied Superconductivity Conference.

Member of the Program Committee for the Inaugural Symposium of the Joint Quantum Institute, March 25-27, 2007, College Park, Maryland.

Chair of the Program Committee for International Superconducting Electronics Conference (ISEC), June 10-14, 2007, in Washington D.C.

4.a.ii. Unpaid reviewing activities for agencies

- reviewed proposals for NSF
- reviewed management of Physics Division of NSF as part of the 1997 Committee of Visitors

4.a.iii. Other unpaid services to local, state and federal agencies

2004 member of the AAT Physics Writing Group. This committee was charged by the State with writing the common requirements for the Associate Arts in Teaching (2-year) degree for Physics, to be used by Community Colleges within the state of Maryland.

4.a.iv. Other non-University Committees, Commissions and Panels, etc

In the past I have chaired poster and oral sessions at several Applied Superconductivity Conferences (including in 2010) and oral sessions at the March Meetings of the American Physical Society, including chaired session T29 “Superconducting Devices and Applications” at the March meeting of the APS 2010.

I served on the 1997 NSF Committee of Visitors. The purpose of this committee was to review the management and the peer review process in the Division of Physics (July 23-25, 1997). We spent two days at the NSF talking to program managers, examining how individual proposals were handled by referees and program managers, and generally trying to assess how the NSF was doing its job.

4.a.v. International activities, not listed above

I chaired the afternoon session on Superconductor Magnetometers at the Workshop on Sensitive Magnetometry (Magnetometrie Haute Sensibilite Et Application), Les Houches, France, June 10, 1997.

I co-chaired a session at the International Symposium on Superconductivity, Tokyo, Japan, Oct. 16, 2000.

I chaired a session at MQC2 in Naples Italy, June 2006.

4.a.vi. Paid Consultancy

Proposal review for NIH, Jan. 2009.

Member of an NIH review panel for proposals, Washington DC, March 23, 2001.

Consulted for American Society for Engineering Education, ASEE-NIST Post-doctoral Fellowship Review Panel, Brookings Institute, Washington D.C., August 14, 1991.

Consulted for Superconductor Technologies Incorporated, Santa Barbara, CA, October 30, 1990.

4.b University

4.b.i. Departmental

1. Ad Hoc Safety Advisor to the Center for Superconductivity Research (now CNAM) since 1992.
2. Gave tours and superconductivity demonstrations to about 20 eleventh and twelfth grade students participating in the Maryland Junior Science and Humanities Symposium, March 27, 1992.
3. Helped set up superconductivity demonstrations and give tours at dedication for Center for Superconductivity Research, October 6, 1992.
4. Helped give tour of Center to a visiting delegation of British scientists, March 1, 1993.
5. Gave tours and superconductivity demonstrations to about 20 eleventh and twelfth grade students participating in the Maryland Junior Science and Humanities Symposium, March 12, 1993.
6. Helped give tours of Center and superconductivity demonstrations as part of Maryland Science Week, April 27, 1993.
7. Gave superconductivity demonstration to visiting State Delegate Morgan, October 29, 1993.
8. Gave tours and superconductivity demonstrations to about 20 eleventh and twelfth grade students participating in the Maryland Junior Science and Humanities Symposium, March 4, 1994.
9. Set up superconductivity demonstration for Open House, October 5, 1995.
10. Gave tours and superconductivity demonstrations to about 20 eleventh and twelfth grade students participating in the Maryland Junior Science and Humanities Symposium, March 15, 1996.
11. Helped give a tour of the Center to SPS students from Towson State, December 6, 1996.
12. Helped judge science fair projects at the Kettering Middle School, February 14, 1997.
13. I helped give demonstrations and tours of the Center for Superconductivity Research to about 25 high school students attending the Maryland Junior Science and Humanities Symposium, March 14, 1997.
14. I participated in the MRSEC tour for REU students of Goddard Space Flight Center, June 26, 1997.
15. I helped show superconductivity demos for two groups from the visiting Girls Summer Program, August 14, 1997.
17. I helped give a tour of the Center for Superconductivity Research to SPS students from Towson State, December 6, 1997.
18. Member of the MRSEC Executive Committee 1997-1999.
19. Member of the APT committee, Fall 1997.
20. Member of Undergraduate Education Committee, Fall 1996 - Spring 1998.
21. Co-chair (with Boyd and Goodman) of Physics Laboratory Committee, Spring 1997 to 1999.
22. Member of Physics Executive Council, 1993, Fall 1997.
23. Member of Salary Committee, Spring 1994 to Spring 1997.
24. Member of Extended Qualifier Committee 1994-2000.
25. Member of the search committee for nano-tech hire (Ellen Williams chairing), Fall 99.

26. Wrote one question for the Fall 2001 qualifier, wrote and graded one question for the Winter 1996 qualifier exam, wrote question for Winter 1994 Qualifier, graded problem for Winter 1992 qualifier.
27. From 2000-2004. as Associate Chair for Undergraduate Education, I help present the Department to prospective students. Typically there are about 10 open houses each year for prospective undergraduates and their families, for example at Visit Maryland Day, November 10, 2000. As another example in 2001, open house events were on Feb. 19, March 9, April 20, Oct 8, Oct 27, Nov 12, Nov. 17.
28. Participated in organizing and helping run the Physics Department's activities for Maryland day in March 2000 and March 2001.
29. Participated in a signing ceremony organized by Professor David Poeppel (Linguistics and Biology) and Stephen Crain, Chair of the Department of Linguistics at UMCP, announcing that they have obtained a commitment to put on campus a multi-channel SQUID system for imaging brain activity. The signing ceremony announcing the deal was held on May 10, 2001 in President Mote's office. Because of my research on SQUIDS, I was invited to attend the ceremony. I also give a tour of the Center on May 9 to visitors from the Kanazawa Institute of Technology who are building the system for the campus.
30. I served on Greg Sullivan's promotion committee, Fall 2000.
31. October 24, 2000. I met with the ABET committee reviewing the accreditation of the Computer Engineering program.
32. December 13, 2000. I gave a brief tour of the SQUID microscopes to President Mote during a visit to the Center for Superconductivity Research organized by R. Greene.
33. December 14, 2000. I gave a brief tour of the SQUID microscopes to the Dean of Life Sciences during a visit to the CSR organized by R. Greene.
34. I assisted with planning and running Maryland Day at the Physics Department since 2000.
35. Completed teaching peer review for Markus Luty and Michael Fuhrer.
36. Serving on the teaching interview committee, 2000-2006.
37. Grading one Qual problem for Sp 2006 qualifier.
38. Serving on the Undergraduate Education Committee (F-2005 to F 2006).
39. Serving on the APT committee (2005-2007).
40. Served on one Honors thesis defense (for Brian Bryce, advised by Bruce Kane) in Dec 2005.
41. In 2005 I served on Ph.D. defense committees for Atif Imtiaz, Dan Sullivan (chaired), Carlos Sanchez (chaired), Matt LaHaye, and Kenton Brown.

In 2006:

42. Chaired the Ph.D. defense committees for Sudeep Dutta.
43. Served on the APT Committee
44. Served on the Lab Sub-committee of the Phase 1 PSC Design Review Committee.
45. Served on the Teaching Interview Committee, helping to evaluate teaching ability of faculty candidates in 2006 and 2007
46. Served on the Executive Committee of the JQI, 5/06 to 12/06
47. Served on the JQI graduate Fellowship Committee 2006 and 2007
48. Served on the JQI Inaugural Symposium Organizing Committee
49. Served on the University's PACAA Committee (Provost's Advisory Committee on Admissions and Advising) (since October, 2004).
50. Served on the Campus CORE committee (Fall 2005-Fall 2007).

In 2007:

55. Served on the Teaching Interview Committee, helping to evaluate teaching ability of faculty candidates in 2007
56. Served on the Executive Committee of the JQI, 1/07 to 12/07
57. Served on the JQI graduate Fellowship Committee 2007
73. assisted Physics Undergraduate office in organizing fall Physics open house for undergraduate students
74. arranged tours of CSR labs for Maryland Day, April 2007
75. graded one problem for Fall 2007 graduate Physics qualifier exam
76. member of Organizing Committee for the Inaugural Symposium of the Joint Quantum Institute CMPS-Physics
77. member of APT committee (Fall 06 -Sp 07)
79. member of Search Committee for the Director of the Joint Quantum Institute
81. Faculty Advisor to the Society of Physics Students
82. Chair of the Lab Committee (2008).

In 2008:

83. Chair of the Lab Committee (2008).
84. Member of the Physics Salary committee
85. Member of the Physical Sciences Complex (PSC) Design Review Committee.
86. Member of a campus committee looking at the impact of the purple line on the campus
87. Wrote one problem for Winter 09 graduate Physics qualifier exam
88. Faculty Advisor to the Society of Physics Students
89. Helped arrange Zone 4 Regional Meeting of the Society of Physics Students, April 2008, College Park
90. Arranged tours of CSR labs for Maryland Day, April 2008

In 2009:

91. Chair of the Physics Salary Committee (elected march 2009).
92. Chair of the Lab Committee.
93. Member of the Physical Sciences Complex (PSC) Design Review Committee.
94. Served on the JQI graduate Fellowship Committee reviewing grad applicants for fall 09
95. Helped arrange tours of CNAM and give superconductivity demonstration on Maryland day, April 25, 2009.
96. Chaired EE Ph.D. thesis defense committee for C. Vlahacos, Nov. 30, 2009.
97. Helped arrange annual CNAM Safety Meeting, June 1, 2009.

In 2010:

98. Helped arrange tours of CNAM and give superconductivity demonstration on Maryland day, April 2010.
99. Chair of the Lab Committee.
100. Member of the Physical Sciences Complex (PSC) Design Review Committee.
101. Chaired the JQI graduate Fellowship Selection Committee, reviewing physics grad applicants for fall 10 for the JQI
102. Served on the Teaching Interview Committee, helping to evaluate teaching ability of faculty candidates.
103. Chaired Ph.D. thesis defense committee for Z. Kim, H. Kwon and A. Przybysz.

In 2011:

104. Chair of the Lab Committee.
105. Member of the Physical Sciences Complex (PSC) Design Review Committee.
106. Member of the Executive Committee of the JQI
107. Served on the Teaching Interview Committee, helping to evaluate teaching ability of faculty candidates
108. Graded one qualifier problem, Jan. 2011.
109. Chair of thesis defense committee for Oliver Oberg.

In 2012:

110. Chair of the Lab Committee
111. Member of the Executive Committee of the JQI
112. Served on the Teaching Interview Committee, helping to evaluate teaching ability of faculty candidates
113. Prepared one qualifier problem for Jan. 2013 exam.

In 2013:

114. Chair of the Lab Committee
115. Member of the Executive Committee of the JQI
116. Chair of Ph.D. thesis defense committees for Ben Cooper
117. Chair of Ph.D. thesis defense committees for Moe Khalil
118. Chair of Ph.D. thesis defense committees for Vitaley Zaretsky
119. Member of Ph.D. thesis defense committee for Kevin Kirshenbaum.
120. Member of Ph.D. thesis defense committee for Ted Thorbeck.
121. Member of the JQI graduate Fellowship Selection Committee, reviewing physics grad applicants for fall 13 for the JQI.
122. Wrote problem for the Fall 2013 Qualifier Exam

In 2015:

123. Ph.D. thesis defense committee for Rangga Budoyo
124. Jeff Grover Ph.D. Thesis defense committee
125. Steve Ziemak Ph.D. Thesis defense committee
126. Connor Hart undergraduate Thesis defense committee
127. Chair of the Lab Committee - the main task I undertook as chair of the Department's Lab committee was to initiate the process of getting all of the Department's lab manual's published on-line. This was not simply a matter of posting PDFs on the web. Over the course of several years I devised a method that coupled automatic grading or prelab questions or homework questions with electronic distribution of the lab manuals. This had the potential to solve several problems, including students pirating the lab manuals, students not getting the lab manuals at all and showing up unprepared, students forgetting or losing their lab manuals, students not being able to buy the manual because the publisher did not print enough or the bookstore did not order enough, and TA's being too overloaded to do a careful and timely job of grading the pre-lab or homework assignments. In addition, students can access the manuals anywhere there is internet access and we can use high resolution color photos and active links to additional content such as the videos I put together as part of a major revision to

Physics 261 and Physics 271. During this time, I discussed what we needed to do with several publishers and eventually located a publisher that was willing to work with us on the new system. In early 2015 I facilitated the signing of a contract between Expert TA and the Department for publication of the Department's lab manuals and the automatic on-line grading of the associated pre-lab or homework assignments. The schedule we agreed upon called for the University to deliver the content to the company for the first four lab manuals (Physics 174, 261, 271, and 275) by mid-June 2015. I had some assistance from Rick Greene who supplied corrections to Physics 174 and Ki-Yong Kim who supplied some corrections to Physics 275, but other than that it took me the better part of a month to prepare suitable questions and prepare revised lab manuals for these for courses. Expert TA set up the first test sites in the summer and I had numerous phone meetings with the head of the company about scheduling of sections, how they adapted their system to display things, and many other issues. The distribution to the first four labs went off on-time in the fall and it took about a month to sort out some wrinkles. The main problem was an over-sight on my part on not being clear on what level of significant figures to require in an answer. There are many other issues that I have had to sort out that arise with going to electronic distribution, such as no paper to write on, but it would take too much space to cover them all here. Finally, I would like to thank Donna Hammer for supporting this large step forward.

128. Ph.D. thesis defense committee for Melissa Trepanier

129. Maryland Day, helped out with Physics Department setup for Maryland Day

In 2016:

130. Chair of the Lab Committee - The main effort was the continued work to get all of the Department's lab manuals into electronic that will be distributed on-line via Expert TA. Over the winter break, I prepared revised lab manuals for Physics 107 and Physics 276 for distribution by Expert TA in the Spring 2016 semester. By mid-February I had completed work on a revised version of Physics 103 and this has now been submitted to Expert TA ahead of the June 2016 deadline. I am currently working on four additional manuals that are due by mid-June 2016. Let me just note briefly that this does not involve simply printing out a PDF of the manual and sending it off. In addition to creating new problems and solutions that are suitable for on-line grading, I have also been updating write-ups that are out of date, attempting to clean up poorly written sections, and creating color figures suitable for display.

131. Member of Ph.D. thesis defense committee for Jasper Drisko, April 6, 2016.

132. Member of Ph.D. thesis defense committee for Yuchen Peng, May 5, 2016.

133. Member of Ph.D. thesis defense committee for Diameng Zhang, July 20, 2016.

134. Chair of Ph.D. thesis defense committee for Alex Jeffers, October 31, 2016.

135. Prepared and graded a problem for the fall 2016 Qualifier exam.

136. Outside faculty opponent for the Ph.D. defense of Marco Arzeo, Chalmers University, Gothenburg, Sweden, Nov. 17, 2016.

137. Helped with setup for Maryland Day, April 30, 2016.

138. Attended Phys 407 presentations for Yuwen Tan (May 16, 2016), Luke Corcos (May 11, 2016), Paula Rodriguez (Dec. 19, 2016)
139. Gave talk on superconductivity at the JQI SciFi writers workshop, July 29, 2016.
140. Facilitated location scouting in PSC for promotional IARPA video for their 10th anniversary.

4.b.ii. College and Divisional

1. A write-up of some of my groups research on SQUIDs and joint work with Chris Lobb and Steve Anlage on SETS and microwave imaging appeared in the Fall 2000 edition of the CMPS magazine the Continuum.
2. Served on the search committee for a CMPS Associate Dean for Undergraduate Education, Spring 2000.
3. May 30, 2000. Gave presentation to Steve Walker and Associates as part of a visit organized by Dean Steve Halperin to make contact with local industrial and technical companies.
4. November 8, 2000. Met with delegation of state and business leaders sponsored by Dean Steve Halperin and gave talk on SQUID microscopy applied to detecting circuit faults.
5. I participated in commencement exercises, including reading the names of all of the CMPS Ph.D. and Masters recipients in Fall 2000 during the ceremony.
6. In 2000, I served on the CMPS Scholarship Committee
7. On October 24, 2000. I met with the ABET committee reviewing the accreditation of the Computer Engineering program.
8. Sat in for Chair at Academic Council meetings (March 7, April 11, September 19, 2001)
9. Member of search/selection committee for Construction Management firm for the new Physical Sciences Complex (fall 2007)
10. Reviewed candidate projects for the Dorfman Prize, an award granted by CMPS to the best undergraduate research by a CMPS student (2007)
11. Member of search committee for CMPS Director of Facilities Management (Spring 2008)
12. Read names of finishing Ph.D. and M.S. students during CMPS graduation ceremony (Dec. 22, 2005, Spring and Fall 2006, Spring and Fall 2007, Spring and Fall 2008 and Spring 2009 ceremonies, Fall 2010).
13. Faculty member on the Physical Sciences Complex (PSC) Construction Management Technical Review Committee (summer 2007 through 2010).
14. College and Departmental faculty representative at bi-weekly construction progress meetings between the University, architect (HDR) and construction management firm (Gilbane) as part of the process of building phase 1 of the Physical Sciences Complex. I am part of the Universities construction management team for the PSC, officially under Tom McMullen. I help review submittals (calculations, product data, physical samples, and mock-of parts used in the building), answer questions about specifications for the labs, access the site as needed to review work, and field questions and comments from faculty. I also helped out with planning for the move, gave numerous tours to current faculty and prospective faculty candidates, and along with others did final punch list inspections of every virtually room in the building except the mechanical wing. This activity ended with the official completion of construction in October 2013, although there have been a few minor items that I dealt with in the following months (2009 to October 2013).

4.b.iii. Campus and University

1. Served on the Banneker-Key Selection committee for 2002, 2004-2007, 2008, 2010, 2013, 2014.
2. Served on Campus PCC Committee, Fall 2008 through Spring semester 2012.
3. Reviewed student proposals for the Senior Summer Scholars Program, a competitive grant sponsored by the University Office of Undergraduate Studies. (2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014).
4. Served on Campus CORE Committee Fall, 2005-Sp 2007.
5. Member of a campus committee looking at the impact of the purple line on campus research (2008-2009).
6. Appointed to the University's PACAA Committee (Provost's Advisory Committee on Admissions and Advising) October, 2004. Served on the PAAC (1-05 to 1-08).
7. Served on a state-wide committee as a member of the Physics Writing Group for the Secondary Associate in the Arts teaching degree for Physics (2003).

4.b.iv. Special Administrative Assignments

Served as Associate Chair for Undergraduate Education, Physics Department of Physics, University of Maryland, College Park (from July 1999 to July 2004).

Appointed Co-Director of the Joint Quantum Institute (March 1, 2017 to present).

4.b.v. Other

1. I helped judge science fair projects at the Kettering Middle School on February 14, 1997.
2. I helped judge science fair projects in the Senior Division at the PG County Science Fair on April 12, 1997.
3. Helped show Physics is Phun Demos at the Maryland State Fair, August 23, 1997.
4. I assisted Prof. Ellen Williams in giving a talk on Science Fair projects to interested parents at a meeting of the Kettering Middle School PTA, November 8, 1997.
5. I presented a Physics is Phun show on "Light and Optics" with Dr. Johan Feenstra at the Kettering Middle School on November 21, 1997 as part of MRSEC outreach to local schools. We did three separate 1-hour shows with a total attendance of about 65 students. The shows were very well received.
6. I served as a Science Fair Mentor at Kettering Middle School, 12-3-97 and 12-17-97 as part of MRSEC outreach to local schools.
7. November 1999, and November 30 and December 1, 2000, I helped give a presentation on "Weird Matter" and a laboratory on the zero of temperature to students at Northwest High School as part of the MRSEC outreach to local high schools.
8. I helped judge science fair projects at Montgomery Blair High School. February 2001, 2002, 2003.
9. I was the outside opponent for the Ph.D. Thesis defense of Raihan Rafique in Feb 2008, at Chalmers Univeristy, Gothenburg, Sweden.
10. With Steve Anlage, I gave a half-day short course on Superconducting Electronics at the 2010 Applied Superconductivity Conference in Washington D.C. Steve Anlage covered "Fundamentals of Microwave Superconductivity", and I gave an overview of "Superconducting Qubits". August 1, 2010. The short course was attended by about 30 people.

11. With Steve Anlage, I gave a half-day short course on Superconducting Electronics at the 2012 Applied Superconductivity Conference in Portland, Oregon, October 7, 2012. Anlage covered “Fundamentals of Microwave Superconductivity”, and I gave an overview of “Superconducting Qubits”. The short course was attended by about 20 people.
12. With Steve Anlage and Benjamin Palmer, gave a half-day short course on Quantum Computing at the 2014 Applied Superconductivity Conference in Charlotte, August 10, 2014.
13. Chaired Session Y48: Decoherence in Superconducting Qubits: Noise at the March meeting of the APS, March 18, 2016.
14. With Ben Palmer helped organize and run a 1-day workshop, Decoherence in Superconducting Qubits 2, College Park, Maryland, April 21-22, 2016. The workshop was attended by about 60 people, including 15 invited speakers.
15. Prepared and ran a full one-day short course on Superconducting Circuits and Quantum Computing at the 2016 Applied Superconductivity, Denver, Colorado, September 4, 2016. The short course was attended by about 30 people.

4.c. Awards and Honors

See section 2j.

Frederick C. Wellstood
March 8, 2017