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EDUCATION

Massachusetts Institute of Technology  
Ph. D. { Physics, June 1989

University of California, Santa Barbara, Department of Physics  
(1990). Graduate course: Condensed matter physics (Physics 223B).

Massachusetts Institute of Technology, Department of Physics  
Recitation Instructor (1988{89). Undergraduate courses: Mechanics (8.01); Electric-  
ity and Magnetism (8.02).

## HONORS & AWARDS

Visiting JILA Fellow, Boulder, Colorado (2019).

Vermont Academy of Science and Engineering (2018).

University Scholar, University of Vermont (2014).

Faculty Research Fellow, Air Force Office of Sponsored Research (1995).

Senior Member, Institute of Electrical and Electronics Engineers (1994).

*Who's Who* in America

American Men and Women of Science

Sigma Xi, scientific honor society

Eta Kappa Nu, electrical engineering honor society

Sigma Pi Sigma, physics honor society

## VISITING APPOINTMENTS

Visiting Fellow, JILA, Boulder, Colorado (2019).

Visiting Scholar, University of Texas, Austin (2007).

Visiting Scientist, Harvard University (1999, 2006).

Visiting Associate Professor, University of California, Santa Barbara (1998, 1999,  
2001).

Visiting Scientist, Kavli Institute for Theoretical Physics, University of California,  
Santa Barbara (1997).

Visiting Scientist, MIT, Department of Physics (1996{7).

Visiting Scholar, University of California, San Diego (1994)

Visiting Scientist, Los Alamos National Laboratory, Materials Science and Technology  
Division (1989).

## GRANTS & PROPOSALS

Grant from NASA (2019-2021) (\$1,250,000) for the study of cold atom interactions  
with surfaces (PI: J. Marshall, co-I.: D.P. Clougherty; grant no. 80NSSC19M0143).

Grant from NASA (2017-2018) (\$37,500) for the study of anisotropic 2D superfluid  
phases in microgravity (P.I.: D.P. Clougherty).

Grant from NSF (2011-2015) (\$286,000) for an REU site on complex materials (P.I.: D.P. Clougherty; DMR-1062966).

Grant from ONR (2010-2013) (\$330,000) for the theoretical study of the mechanical and thermal properties of metallic glasses (P.I.: M. Eberhart, co-PI: D.P. Clougherty; N00014-10-1-0838).

Grant from NSF (2008-2012) (\$240,000) for the study of many-body effects in particle-surface scattering (P.I.: D.P. Clougherty; DMR-0814377).

Grant from DARPA (2006-2007) (\$167,000) for the study of theoretical models of metallic glasses (P.I.: M. Eberhart, co-I: D.P. Clougherty).

Grant from VT EPSCoR (2004) (\$20,000) was awarded for a high performance computational cluster (P.I.s: K. Chu, D.P. Clougherty, R. Headrick, J. Rankin)

Grant from DARPA (2001-2005) (\$450,000) for the study of structure-property relationships in intermetallic design (P.I.: M. Eberhart; co-I: D.P. Clougherty; #MDA9720110041).

Grant from Smithsonian Institution (1999-2000) (\$15,000) was awarded to investigate ferroelectricity in fulleride systems (P.I.: D.P. Clougherty).

Grant from University Committee on Research and Scholarship (\$4,500) (1998) was awarded to perform electronic structure calculations on strongly correlated clusters and molecules.

Grant from American Chemical Society{Petroleum Research Fund (1994-1997) (\$30,000) was awarded to investigate ultra-low energy physisorption of atoms onto surfaces at finite temperature (P.I.: D.P. Clougherty).

Grant from University Committee on Research and Scholarship (\$4,600) (1993) was awarded to study the scaling behavior of threshold sticking on low energy atoms on

Mr. Adam Doherty, "Quantum Sticking of Cold Atomic Hydrogen to Graphene," B.S. Honors thesis, Physics (2013).

Dr. Yanting Zhang, "Orthogonality Catastrophe in Quantum Sticking," Ph.D. thesis, Materials Science (2012).

Mr. Ian Goyette, "Breaking Quantum Mirrors with Thermal Fluctuations," M.S. thesis, Physics (2011).

Dr. Charles Foell, "Theory of Vector Polarons," M.S. thesis, Physics (2006).

Mr. John Gergely, "Phonons and Thermal Transport in Carbon Nanotubes," B.A. Honors thesis, Physics (2002).

Mr. Xiang Zhu, "Thomas-Fermi Theory of Fullerenes," M.S. thesis, Physics (1996).

Mr. John Gorman, "A Theoretical Study of the Vibrations of  $C_{60}$ ," B.S. Honors thesis, Physics (1995).

## OTHER PROFESSIONAL EXPERIENCE

Served as consultant to various institutions, including Akzo Research, Inc. (1991-3), Los Alamos National Laboratory, Materials Science and Technology division (1987-90), Massachusetts General Hospital, Department of Neurology (1985-89), Optex Corporation, Rockville MD (1995-6), and Quantum Energy Technologies, Inc., Cambridge, MA (1997-2001), TecPlot Inc. Bellevue, WA (2007-11) and Taylor Associates, Winooski, VT (2008-11). Scientific adviser to Bloomberg & O'Hara, Burlington VT (1996-8), Cheney, Brock & Saudek, P.C., Montpelier VT (2006), "Absolute Zero and the Conquest of Cold" American Physical Society national educational campaign (2007-8).

Serve as ad-hoc referee for many scientific publications, including Physical Review A & B, Physical Review Letters, Carbon, Physica C, the International Journal of Quantum Chemistry, the Journal of Materials Science, the Journal of Magnetism and Magnetic Materials, Journal of Physics and Chemistry of Solids, Nature, Physica Status Solidi B, Journal of Physical Chemistry A & B and the Journal of Chemical Physics.

Serve as ad-hoc referee for funding agencies, including NSF, Petroleum Research Fund (ACS), the Research Foundation, the Department of Energy and the U.S. Civilian Research and Development Foundation.

Serve as a reviewer for a variety of publishing companies, including Wiley, Addison-Wesley, W.H. Freeman & Co., McGraw-Hill, and Taylor & Francis.

Chair, faculty research misconduct committee, appointed by Vice President for Research (2017)

Search Committee for Director of Institutional Research, appointed by Provost (2016)

Chair, Selection Committee for Williams Professor of Mathematics, appointed by Dean of Engineering and Mathematical Sciences (2016)

Chair, Faculty Grievance Panel, appointed by Provost (2016)

Search Committee for Interim Dean, College of Arts & Sciences (2015)

Chair, Search Committee, Department of Geology (2009{10)

Member, Transdisciplinary Research Initiative Working Group on Environment, appointed by Provost (2009{2010)

Chair, Review Panel on research misconduct, appointed by Dean of the College of Arts & Science (2008{9)

Faculty Standards Committee, elected by faculty of the College of Arts & Science (2007{2008)

Chair, Grievance Panel for Reappointment, Promotion & Tenure, appointed by Provost (2005)

Chair, Committee for the Pomeroy Professor of Chemistry, appointed by Dean of College of Arts & Science (2003)

Materials Science Steering Committee, (1994, 1998{2003)

Chair, Graduate Studies, Department of Physics (1993{98)

Executive Committee, Department of Physics (1993{96)

College of Engineering Curriculum Committee (1993{95, 2007)

Chair, Colloquium Committee, Department of Physics (1992{97)

## External

Vermont Academy of Science & Engineering, Science Education & Outreach (2018)

National Science Foundation, Panel (2007, 2012, 2013, 2019)

Science Advisory Committee, ECHO Science Center, Burlington VT (2010-)

Visiting Committee, Colorado School of Mines, Materials Science Program (2008-10)

Scientific advisory board, 5th International Conference on Materials Science & Engineering, Guelma, Algeria (2008)

Organizing Committee, International Workshop on Quantum Reflection, ITAMP, Harvard University (2007)

Scientific advisory board, 3rd International Conference on Density Functional Theory of Metals and Alloys, Oran, Algeria (2007)

Visiting Committee, Massachusetts Institute of Technology, Department of Physics (1988)

## PUBLICATIONS

D. P. Clougherty \Comment on "Theory of phonon-assisted adsorption in graphene: Many-body infrared dynamics," *Phys. Rev. B* (2020). [arXiv:1910.00361]

D. P. Clougherty and E. Heinrich, \Thermal and quantum fluctuations of a thin elastic plate," *Phys. Rev. B* (2020). [arXiv:1902.11252]





J.M. McKittrick, R. Contreras, and D. P. Clougherty, "Aligned Gadolinium Copper Oxide Thick Films Formed by In-Situ Crystallization in a Magnetic Field," *J. Mat. Res.* 8, 438-448 (1993).

D. P. Clougherty and W. Kohn, "Quantum Theory of Sticking," *Phys. Rev. B* 46, 4921 (1992).

D. P. Clougherty and W. Kohn, "Low-Energy Behavior of Quantum Adsorption," arXiv:cond-mat/9205004 (1992).

K.H. Johnson, D. P. Clougherty and M.E. McHenry, "Fullerene Superconductivity and the Dynamic Jahn-Teller Effect," *Science* 255, 1490 (1992).

D. P. Clougherty, M. E. McHenry, J. M. MacLaren, "Magnetism in 4d Transition Metal/Ag(001) Sandwiches," in *Magnetic Thin Films, Multilayers and Surfaces*, H. Hopster, S. S. P. Parkin, G. Prinz, J. P. Renard, T. Shinjo, and W. Zinn, eds. (1991).



K. H. Johnson and D. P. Clougherty, "Hydrogen-Hydrogen/Deuterium-Deuterium Bonding in Palladium and the Superconducting/Electrochemical Properties of  $\text{PdH}_x=\text{PdD}_x$ ," *Mod. Phys. Lett. B* 3 795-803 (1989).

K. H. Johnson, D. P. Clougherty, and M. E. McHenry, "Dynamic Jahn-Teller Coupling, Anharmonic Oxygen Vibrations, and High  $T_c$  Superconductivity," *Mod. Phys. Lett. B* 3 1367-74 (1989).

D. P. Clougherty, K. H. Johnson, and M. E. McHenry, "Dynamic Jahn-Teller Coupling and High  $T_c$  Superconductivity," *Physica C* 162-164, 1475 (1989).

K. H. Johnson, D. P. Clougherty, and M. E. McHenry, "Nd, Ce(f)-O(p) Hybridization in  $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$  and Dynamic Jahn-Teller Pairing in High  $T_c$  Superconductors," *Mod. Phys. Lett. B* 3 867-875 (1989).

D. P. Clougherty and K. H. Johnson, "Thermodynamic Critical Fields in High  $T_c$  Superconductivity," *Physica C* 153-155 699 (1988).

## PATENTS

D. P. Clougherty and M. E. Eberhart, "Molecular identification and electron resonance system and method." US Patent 7,570,055 B1, granted August 4, 2009.

## CONTRIBUTED PRESENTATIONS

"Quantization of the Vibrations of a Thin Elastic Plate," American Physical Society, Boston MA, March 2019.

"Radiative Corrections to Quantum Sticking for Cold Atoms on Suspended Graphene," American Physical Society, Los Angeles CA, March 2018.

"Infrared Problem in Cold Atom Adsorption on Graphene," Physics and Chemistry of Surfaces and Interfaces, Kona, Hawaii, January 2018.

"Infrared Problem in Quantum Acoustodynamics," NASA Fundamental Physics Workshop, Santa Barbara, CA, June 2017.

"Infrared Problem in a Hybrid System: Ultracold Atoms Coupled to a Vibrating Membrane," American Physical Society, New Orleans, March 2017.

"Infrared Problem in Quantum Acoustodynamics," Frontiers in Nanomechanical Systems, La Thuile, Italy, February 2017.

"Novel Infrared Dynamics of Cold Atoms on Hot Graphene Membranes," American Physical Society, Baltimore, MD, March 2016.

"Self-energy of a Cold Atom Interacting with an Elastic Membrane," American Physical Society, San Antonio, TX, March 2015.

"Quantum Sticking of Atoms on Membranes," American Physical Society, Madison, WI, June 2014.

\Quantum Sticking of Atomic Hydrogen on Graphene," American Physical Society, Baltimore, MD, March 2013.

\Thermal Effects on Quantum Sticking," American Physical Society, Boston, MA, March 2012.

\Breaking Quantum Mirrors with Thermal Fluctuations," American Physical Society, Dallas, TX, March 2011.

\Thermal Effects in Quantum Sticking," American Physical Society, Seattle, WA March 1993.

\Dynamic Jahn-Teller Theory of Superconductivity in Ceramics, Organics, and Fullerenes," Materials Research Society, Boston, MA, November 1992.

\Dynamic Jahn-Teller Effects in High  $T_c$  Superconductors," Conference on Lattice Effects in High  $T_c$  Superconductors, Santa Fe, NM, January 1992.

\Threshold Behavior of Quantum Sticking of Charged Particles on Surfaces," Conference on Surface Interactions of Highly Charged Ions, Institute for Theoretical Physics, UC Santa Barbara, Santa Barbara, CA December 1991.

\Magnetism of 4d-Transition Metal/Ag Sandwiches," Materials Research Society, Anaheim, CA, May 1991.

\Low Energy Behavior of Quantum Sticking," American Physical Society, Cincinnati, OH, March 1991.

\Local Spin-Density Calculations in Fe," American Physical Society, Anaheim, CA, March 1990.

\Investigation of Tip-Surface Interactions in the Atomic Force Microscope: Theory and Experiment," American Physical Society, Anaheim, CA, March 1990.

\Dynamic Jahn-Teller Coupling and High  $T_c$  Superconductivity," International Conference on High Temperature Superconductors and Materials and Mechanisms of Superconductivity, Poster Presentation, Stanford University, July 1989.

\Spin Susceptibilities of Clusters and Molecules Using Spin Density Functional Theory," American Physical Society, St. Louis, MO, March 1989.

\Thermodynamic Critical Fields in High  $T_c$  Superconductivity," International Conference on High Temperature Superconductors and Materials and Mechanisms of Superconductivity, Poster Presentation, Interlaken, Switzerland, 1988.

\Superconductivity and Magnetism," MIT Industrial Liaison Conference on Superconductivity, Cambridge, MA, 1988.

## INVITED PRESENTATIONS

\Infrared Problem in Quantum Acoustodynamics," JILA, University of Colorado, Boulder, June 2019.

\Infrared Problem in Cold Atom Adsorption on 2D Materials," NORDITA conference on Dynamic Quantum Matter, Stockholm, Sweden, December 2018.

\Infrared Problem in Cold Atom Adsorption on  $\text{Cu}_2\text{S}$ , \Infrared Prob226 Tn Con-on DynamicSy

\Infrared Problem in Quantum Acoustodynamics," Physics Colloquium, University of Rhode Island, April 2017.

\Quantum of Surprise," University Scholar lecture, University of Vermont, November 2014.

\Dissipation and Decoherence of a Jahn-Teller Impurity in a Solid," XXII International Symposium on the Jahn-Teller Effect, Technische Universität Graz, Austria, August 2014.

\Berry-Phase Approach to Electric Polarization and Charge Fractionalization," XX International Symposium on the Jahn-Teller Effect, University of Fribourg, Switzerland August 2010 (with Junren Shi, Di Xiao and Qian Niu).

\Nanoscience and Nanotechnology," ECHO Science Center, Burlington VT April 3, 2010.

\Polarization Induced by Inhomogeneity," Orbital Magnetization in Condensed Matter Workshop, Lausanne, Switzerland June 2009 (with Junren Shi, Di Xiao and Qian Niu).

\Nanoscience and Nanotechnology: Size Matters," Café Scientifique, ECHO Science Center, Burlington VT January 2009.

\Fractional Electrons{It's just a phase they pass through," Department of Physics and Astronomy Colloquium, Dartmouth College November 2008.

\Electron Fractionalization in Jahn-Teller Crystals," XIX International Symposium on the Jahn-Teller Effect, University of Heidelberg, Germany August 2008.

\Quantum Reflection in Sticking and Scattering from Surfaces," Workshop on Quantum Reflection, ITAMP, Harvard University, Cambridge, MA October 2007.

\Novel Multiband Polarons and Solitons," Third International Workshop on Density Functional Theory, Oran, Algeria May 2007.

\Ultracold Atoms at Surfaces: Sticking, Scattering and Quantum Dissipation," University of Texas at Austin, Condensed matter seminar, February 2007.

\Polarons and Solitons in Jahn-Teller Systems," International Centre for Theoretical Physics, Trieste, Italy August 2006.

\Fullerenes and Nanotubes for Mathematicians," Department of Mathematics, University of Vermont, Burlington, Vermont, October 2002.

\The Kondo Effect in a Vibronic System," Department of Physics, McGill University, Montreal, Canada, September 2002.

\Inversion Symmetry Breaking in Endohedral Fullerenes," Department of Physics colloquium, University of Georgia, February 2001.

\Inversion Symmetry Breaking in Endohedral Fullerenes," Condensed Matter Physics seminar, Dartmouth College, October 2000.

\Spontaneous Polarization in Endohedral Fullerenes," Institute for Theoretical Atomic

\Dynamic Jahn{Teller Effect and High  $T_c$  Superconductivity," Workshop on Mechanisms of High  $T_c$  Superconductivity, University of Miami, January 1991.

\Dynamic Jahn{Teller Theory of High  $T_c$  Superconductivity," Department of Physics, California State University{ Fullerton, March 1990.

\Recent Improvements within the Local Spin Density Approximation with Applications to Magnetic Systems," Fall Symposium on Theory-Assisted Materials Development, Materials Processing Center, MIT, Cambridge, MA, November 1989.

\Vibronic Interactions and Superconductivity: Breakdown of the Born-Oppenheimer