

Resume: Rodney L. Varley

EDUCATION:

Stevens Institute of Technology (High Honors) B.S. 1969

Brandeis University, PhD 1976; Thesis Title: A Nonequilibrium Analogue of the Percus-Yevick Equation; Advisor Eugene P. Gross

ACADEMIC AND PROFESSIONAL HONORS:

Member of New York Academy of Sciences

Sigma Xi (Science)

Naval Research Laboratory--American Society of Engineering Education Summer

NSF Travel Grant-NATO Summerschool in Strongly Coupled Plasmas; Orleans, France (1977).

Research Fellow (Washington, DC, 1982).

Falkoff Graduate Student Teaching Award (1975)

NSF Traineeship 1969-73

Valedictorian of Graduating Class (1969)

Shared First in Physics Prize (1969)

Tau Beta Pi, Engineering Honor Society

PROFESSIONAL EMPLOYMENT:

1980-present Associate Professor, Hunter College E-mail: rodney.varley@hunter.cuny.edu

1981-1982 Visiting Assoc. Prof., Lehigh,, Bethlehem, Penna. (Fellowship leave from Hunter C).

1975-1979 Assistant Professor, Hunter College

1974-1975 Teaching Assistant, Brandeis University

BOOK PUBLICATION:

"*Mathematica Exercises in Introductory Physics*" (Prentice Hall, 1996) 207 pages ISBN 0-13-231739-7

PUBLICATIONS IN JOURNALS:

1."Approximate Solutions of the Liouville Equation IV. The Two-Body Additive Approximation", with K.D. Bergeron and E.P. Gross; Journal of Statistical Physics 10 (1974) pages 111-138.

2."The Long Time Behavior of the Velocity Autocorrelation Function in a Plasma", Physics Letters 62A

(1977) pages 340-342.

3."Conformation of 1-(2-bromophenyl)azetidin-2-one and 1-(2-bromophenyl)pyrrolidin-2-one" by H. Fujiwara, R.L. Varley and J. M. van der Veen; Journal of the Chemical Society 5 (1977) 547.

4."A Nonequilibrium Analogue of the Percus-Yevick Equation", Physics Letters 66A (1978) pages 41-43.

5."The Velocity Autocorrelation Function in a Strongly Coupled, Pure Electron Plasma", with J.E. Tigner, Physical Review Letters 43 (1979) pages 1113-1116.

6."An Alternative Construction of the Percus-Yevick Equation Based on the Equilibrium BBGKY Hierarchy", Journal of Statistical Physics 21 (1979) 87-100.

7."A Nonequilibrium Analogue of the Percus-Yevick Equation", Journal of Statistical Physics 24 (1981) pages 301-323.

8."Dynamics of a Brownian Particle in a Plasma in the Long-Time Limit", with Ron Dickman, Physica 105A (1981) pages 337-346.

9."A Generalized Oseen Theory of Two-Dimensional Brownian Motion", Physica 108A (1981) pages 417-440.

10."A Generalized Faxen's Theorem for Two-Dimensional Brownian Motion", Physica 127A (1984) pages 363-387 with Ru-Ling Zhou.

11."Particle Accelerators in High Earth Orbit" authors: R. Varley, R.G. Hohlfeld, G. Sandri, C. Cercignani; Il Nuovo Cimento B 105 (1990) 23-29.

12."Peculiar Correlation Functions and Bare Transport Coefficients, with Guido Sandri Physics Letters 124A, 1987, 411.

13."Chaos: Making of New Science" in Bookshelf of Connect Journal of the NY CETP vol #3 (fall, 1996).

14."The Bare Diffusion Coefficient and the Peculiar Velocity Auto-correlation Function", on-line physics journal at <http://arXiv.org/abs/cond-mat/0402422>.

15. "The Bare Diffusion Coefficient and the Peculiar Velocity Auto-correlation Function", Fluctuations and Noise Letters vol #6 (2006) pp. 179-199.

16. "A Singularity in the First-order PY Equation for a Square Well Fluid", by S. Shanack and R. Varley, July 2008, on-line physics journal at <http://arXiv.org/physics/chem.phys.0807.2878>

COURSE WEBSITES and COURSE DEVELOPMENT:

1. Numerical Methods I PHYS 385/685 MATH 385/685 CSCI 385.

@ <http://athena.ph.hunter.cuny.edu/Physics385/default.htm>

2. *Mathematica* Methods in Introductory Physics

@ <http://athena.ph.hunter.cuny.edu/Physics111Math/math.htm>

3. Statistical and Thermal Physics PHYS 336

@ <http://athena.ph.hunter.cuny.edu/Physics336/default.htm>

4. CORE 4 Website part of the Integrated Math/Physics/Chemistry course

@ <http://patsy.hunter.cuny.edu/CORE/icc.html>

5. Modern Physics Lab PHYS 235 (under development)
@ <http://athena.ph.hunter.cuny.edu/Physics235/default.htm>
6. Classical Physics Lab PHYS 230 (under development)
@ <http://athena.ph.hunter.cuny.edu/Physics230/default.htm>
7. Electronics Lab PHYS 222 (under development)
@ <http://athena.ph.hunter.cuny.edu/Physics222/default.htm>
8. Plasma Physics PHYS 424 (under development)
@ <http://homepage.mac.com/prof.varley/Education1.html>

Developed and taught a course in the Honors Program at Hunter College entitled "Chaos" fall 1990. This cross disciplinary course introduced computer programming and some recent developments in mathematical science (fractals, chaos, entropy etc.) to a group of 18 bright but not especially mathematically inclined students

ADVISOR to MA and PhD Students.

1. Ron Dickman (MA student; Hunter C.; Ph.D U.Texas Austin).
2. Tom Russo (MA student; Hunter C., Ph.D (Columbia U.)
3. Ru-Ling Zhou (advisor with C.K. Chu; Ph.D student CUNY) 1987. Now Assoc. Research Scientist, Dept of Medicine, College of Physicians and Surgeons, Columbia University.
4. John Tigner (Post Doc. Hunter C.).

TALKS AT MEETINGS:

- 1."Asymptotic Behavior in Time of Velocity Autocorrelation Functions", Bulletin American Physical Society 21 (1976) 1086 APS Plasma Division Meeting, CA.
- 2."Asymptotic Time Behavior of Correlation Functions in a Strongly Coupled Plasma", with J.E. Tigner and R. Wohlers. Bulletin of the American Physical Society 23 (1978) 885 APS Plasma Physics Division Meeting, Colorado Springs, CO.
- 3."Brownian Motion in a Strongly Coupled Plasma", with R. Dickman Bulletin American Physical Society 24 (1979) 1093 APS Plasma Physics Division Meeting, Boston MA.
- 4."A Nonequilibrium Analogue of the Percus-Yevick Equation", 14th International Conference on Thermodynamics and Statistical Mechanics IUPAP (Edmonton, Canada) August 1980.
- 5."The Ultimate Long Time Behavior of the Velocity Autocorrelation for Two-Dimensional Brownian Particles", Bulletin American Physical Society 25(1980) 1076. APS Fluid Division Meeting, Cornell University.

- 6."The Ultimate Long Time Behavior of the Velocity Autocorrelation for 2d Brownian Particles", Bulletin American Physical Society 26 (1981) 587. Spring APS Meeting Baltimore, Maryland.
- 7."Lagrangian Simulation of the Flow Past a Cylinder" with M.H. Emery, M.J.Fritz, and D. Fyfe (Naval Research laboratory). Bulletin of the American Physical Society 27(1982) 1190. APS Fluid Division Meeting, Rutgers University.
- 8."Brownian Motion in Two Dimensions", APS Fluid Division Meeting, Nov. 20, 1983 Houston, Texas.
- 9."Analytical Solution of the Alder-Wainwright Model of a Fluctuation with Singular Initial Conditions: Two and Three Dimensions." with Christopher Lee Bulletin of the American Physical Society (Nov., 1985) APS Fluid Division Meeting.
- 10."Space Accelerator Project" with Guido Sandri (March, 1988) Bulletin of the American Physical Society. APS General Meeting.
11. "An Introduction to the Use of Mathematica in Teaching with Examples from Mathematics, Biology, and Chemistry." NY CEPT Workshop I at Hunter C.Sept. 27, 1996.
12. "Teaching Physics Using the Book Entitled, Mathematica Exercises in Introductory Physics." NY CEPT Workshop II at Hunter C. Sept. 27, 1996.
- 13."Using Mathematica to Teach Introductory Physics", AAPT Winter 1997 Meeting, Phoenix, AZ January 4-9 1997.
14. "Teaching Physics Using Mathematica Exercises in Introductory Physics", AAPT Winter 1998 Meeting, New Orleans, LA January 2-8 1998.
15. "*Mathematica* Explorations of Alternative Physical Realities." 118th AAPT National Meeting, Anaheim, CA
16. "An Ideal Gas Law Teaching Module" poster presented at the Gordon Conference on Physics Research and Education, June 11-16, 2000 at Plymouth State College, Plymouth NH. Part of the CORE Research Project with Pamela Mills, William Sweeney, Joe Roitberg, Robert Marino.
- 17."Molecular Dynamics Calculation of the Wavelength Dependent, Bare Diffusion Coefficient." Talk given at APS Division of Fluid Dynamics Meeting, Washington, DC. November 2000. Abstract DE10.
- 18."Mathematica with a Numerical Methods Course", Talk given at APS April 2003 Meeting, Philadelphia, PA.
- 19."Teaching a Numerical Methods Course using *Mathematica*, talk given at the Hunter College, NSF Mathematics and Computer Science Seminar Oct 28, 2003. Ada Peluso and Virginia Teller hosts.
- 19."The Bare Diffusion Coefficient and the Peculiar Velocity Autocorrelation Function", Talk at the 91st Statistical Mechanics Conference (Rutgers University), May 16-18, 2004.

GRANTS:

INTEGRATED CORE CURRICULUM FOR MATHEMATICS, PHYSICS AND CHEMISTRY GRANT: An NSF and FIPSE supported grant to develop a four-semester integrated core curriculum comprised of pre-calculus mathematics, general chemistry, and college physics. Students usually take mathematics first, chemistry second and physics last. The combined failure rate for these courses is 60%

with most of the students failing either mathematics or chemistry and never making it to physics. This enormous failure rate has motivated a rethinking of the content and pedagogy of our introductory science courses. A large fraction of students taking the traditional course sequence are post-BA students. Students taking the integrated CORE course are mostly freshman and sophomore students and these students would generally never take physics.

Co-Pi 1999-2001.

MARC Grant for encouraging minority students to enter the sciences. Participant. PI Peter Lipke (Biology).

NY CETP NSF GRANT: \$5 MEG total over five years (\$100k/year at Hunter C.) New York City Collaborative for Excellence in Teacher Preparation. NY CETP An NSF Cooperative Agreement DUE-9453606 involving faculty at Hunter, City, Brooklyn, Lehman, and Staten Island Colleges of the City University as well as New York University in an effort to improve teaching of science at the K-12 level throughout NYC. Grant Coordinator 1996-98, Co-PI 1998-99.

P.I. for Instrumentation and Laboratory Improvement Grant (ILI) 1987-89; Development of Introductory Computer Interface Experiments in Physics Teaching Lab.

1989-1996 NSF Grant for CRAY Super Computing Services (computer time) at Pittsburgh, PA. with Mihlay Mezei. Development of MCMD Program to compute the Peculiar Velocity Auto-correlation Function for a hard core system.

PSC-CUNY AWARDS:

1. "Peculiar Correlation Function and the Bare Transport Coefficients."

PSC-BHE Grant #6-64285 (renewal) \$7,447.

July 1, 1991-December 31, 1992

2. "Fluid Flow about a Cylinder in a Nonuniform Motion at Low Reynolds Number."

PSC-BHE Grant #6-64285 (renewal) \$4,080.

July 1, 1984-December 31, 1985

3. "Fluid Flow about a Cylinder in a Nonuniform Motion at Low Reynolds Number."

PSC-BHE Grant #6-63277(new) \$6,360.

July 1, 1983-June 30, 1984

4. "Calculation of the Velocity Autocorrelation Function in Two and Three Dimensions for all Times utilizing the Nonequilibrium Analogue of the

Percus-Yevick Equation (Higher Densities).

PSC-BHE Grant #13416 (renewal) \$8,120.

July 1, 1980-June 30, 1981

5."Calculation of the Velocity Autocorrelation Function in Two and Three Dimensions for all Times utilizing the Nonequilibrium Analogue of the Percus-Yevick Equation."

PSC-BHE Grant #13102 (renewal) \$10,260.

July 1, 1979-June 30, 1980.

6."Calculation of the Velocity Autocorrelation Function in Two and Three Dimensions for all Times utilizing the Nonequilibrium Analogue of the Percus-Yevick Equation."

PSC-BHE Grant #12351 (new) \$9,750.

July 1, 1978-June 30, 1979.

7."Bohm-like Plasma Transport Coefficients for Arbitrary Constant External Magnetic Field."

PSC-BHE Grant #11502

January 1, 1977-June 30, 1978 \$4,612.

CONFERENCE AT MUSEUM OF NATURAL HISTORY: Member of organizing committee (with Frank Gardella-Curriculum and Teaching) of one day conference devoted with Activity or Inquiry Based Teaching in K-12. Leon Lederman was the keynote speaker and K-12 faculty from throughout NYC attended. April 21 1998.

COMMITTEE SERVICE:

INTERMEDIATE LAB COORDINATOR: Lab Supervisor for Intermediate Level Physics Laboratories: Responsible for repair/maintenance of instructional lab and for introduction of new experiments.

TEP ADVISOR: Teacher Education in Physics Advisor and Teacher Opportunity Program TOP Advisor.

Arts and Sciences Curriculum Committee-member 1987-2003.

Senate Computers and Technology Committee-member 2000-currently

Physics Major & BA-MA student advisor; Hunter C. Physics Dept 1987-2003.

Member of the provost's committee to revise the Hunter College, Science Teacher Education Program.

Other members of this committee were from biology, chemistry, physics, and mathematics as well as

from the School of Education. Hunter College was asked to join the Teacher Opportunity Program developed by the Board of Higher Education and the first group of students entered this scholarship program June 1999. A unique feature of this program is that students graduate with an MA degree and certification to teach in two areas of science or mathematics. This has improved employment prospects of future high school physics teachers. 1998-99

RESEARCH INTERESTS:

Study of the statistical properties of dense gases and liquids. Calculation of transport coefficients especially the diffusion constant using molecular dynamics simulations on computers for systems of hard core particles. Model calculation of the peculiar velocity autocorrelation associated with bare diffusion coefficients. Renormalization/mode coupling calculations of transport coefficients. Virial expansion calculations of the bare transport coefficients.

Statistical mechanics calculation of fall rate of submicron sized particles using Wiener processes to simulate the fluctuating force in the Langevin equation. The gravitational force as well as the nonlinear Oseen correction to the Stokes law are included.

Study of turbulent diffusion and other transport properties in magnetized, strongly coupled plasmas.

Science education research especially involvement in various methods of engaging students in active learning. Development of modules for classroom use involving student generated computer simulations using *Mathematica*. Develop web site for second semester of a numerical methods course PHYS 485/695 MATH 485/695 CSCI 485. Work on integration of the laboratory and lecture experience in the introductory physics course.