

UNIVERSITY OF MARYLAND  
Department of Physics  
College Park, Maryland

Curriculum Vitae (9/04)  
Alex J. Dragt  
Professor

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I. Education

A.B.	Calvin College	1958	Mathematics and Chemistry
Ph.D.	Univ. of Calif. at Berkeley	1964	Physics

II. Experience in Higher Education

A. Teaching and Research

Regular Positions

2004-	Professor Emeritus, University of Maryland
1974-2004	Professor, University of Maryland
1968-74	Associate Professor, University of Maryland
1965-68	Assistant Professor, University of Maryland
1963-65	Member, Inst. for Advanced Study, Princeton, NJ
1962	Research Assistant, University of Maryland

Visiting Positions

2001 Fall	Visiting Professor, Calvin College
1996 Fall	Member, Institute for Theoretical Physics, Univ. of Calif., Santa
	Barbara
1984 Fall	Visiting Professor, Texas A&M University
1973 Spring	Member, Institute des Hautes Etudes Scientifiques, Bures-Sur-Yvette, France
1972 Fall	Visiting Professor, Calvin College

B. Administrative

1975-78	Chairman, Department of Physics and Astronomy, University of Maryland
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III. Experience other than Higher Education

2002 Spring	Guest Scientist, Lawrence Berkeley National Laboratory
1995 Spring	Visiting Physicist, Stanford Linear Accelerator Center
1987 Spring	Guest Scientist, SSC Design Center, Lawrence Berkeley National Laboratory
1986 Fall	Visiting Staff Member, Los Alamos National Laboratory
1985 Fall	Guest Scientist, SSC Design Center, Lawrence Berkeley National

Laboratory

1985-	Consultant, Lawrence Berkeley National Laboratory
1985-	Consultant, Texas Accelerator Center
1984 Fall	Visiting Staff Member, Texas Accelerator Center
1979-	Consultant, Los Alamos National Laboratory
1978-79	Visiting Staff Member, Los Alamos National Laboratory

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### III. Experience other than Higher Education (continued)

1965-66, 1963	Staff Scientist, Aerospace Corporation
1961-62	Sr. Scientist, Lockheed Missiles & Space Corporation

### IV. Publications

See attached bibliography.

### V. Professional Activities

American Geophysical Union  
American Mathematical Society  
American Physical Society  
American Association for the Advancement of Science

### VI. Honors and Awards

NSF Predoctoral Fellow, 1959-62  
University of Maryland Regents' Award for Excellence in Teaching, 1967  
University of Maryland Distinguished Scholar-Teacher, 1984-85  
Calvin College Distinguished Alumnus, 1985  
Listed in Who's Who In America  
Fellow, American Physical Society

### VII. Theses Directed

See attached list.

### VIII. Grants, Contracts, and Awards

See attached list.

### IX. Professional Service

See attached list.

### X. University Service other than Teaching

See attached list.

### XI. Courses Taught at the University of Maryland

See attached list.

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### A. Refereed or invited papers in journals and books

1. EFFECT OF HYDROMAGNETIC WAVES ON THE LIFETIME OF VAN ALLEN RADIATION PROTONS, *J. Geophys. Res.* 66: 1641-49 (1961).
2. THE ATTENUATION OF HYDROMAGNETIC WAVES IN THE IONOSPHERE, with R. Karplus and W. Francis, *Planet. Space Sci.* 9: 771-85 (1962).
3. ANALYTICITY AND UNITARITY OF GENERAL TRANSITION AMPLITUDES, with R. Karplus, *Nuovo Cimento* 26: 168-76 (1962).
4. POLES IN COUPLED SCATTERING AMPLITUDES, with R. Karplus, *J. Math. Phys.* 5: 120-26 (1964).
5. TRAPPED ORBITS IN A MAGNETIC DIPOLE FIELD, *Rev. Geophys.* 3: 255-98 (1965).
6. CLASSIFICATION OF THREE PARTICLE STATES ACCORDING TO  $SU(3)$ , *J. Math. Phys.* 6: 533-53 (1965).
7. SOME SIMPLE CONSEQUENCES OF  $SU(4)$  SYMMETRY, with C.H. Woo, *Phys. Rev.* 139: B945-46 (1965).
8. RELATIVISTIC THREE-PARTICLE  $SU(3)$  STATES, *J. Math. Phys.* 6: 1621-25 (1965).
9. COSMIC RAY AND SOLAR PROTON ALBEDO NEUTRON DECAY INJECTION, with M. Austin and R.S. White, *J. Geophys. Res.* 71: 1293-1304 (1965).
10. AMOUNT OF FOUR PARTICLE PRODUCTION REQUIRED IN S-MATRIX THEORY, *Phys. Rev.* 156: 1588-94 (1967).
11. NEW THEOREMS ABOUT SPHERICAL HARMONIC EXPANSIONS AND  $SU(2)$ , with B. Beers, *J. of Math. Phys.* 11: 2313-2328 (1970).
12. SOLAR CYCLE MODULATION OF THE RADIATION BELT PROTON FLUX, *J. Geophys. Res.* 76: 2312-2344 (1971).
13. ANALYTIC PROPERTIES OF THE PHASE MATRIX, *J. of Math. Phys.* 12: 965-969 (1971).

14. SIGNAL AVERAGING AT MODEST COST, with D. Hudgings, Am. J. Phys. 40: 1206-1212 (1972).
15. ROTATIONAL ANALYTICITY OF THE S-MATRIX, with G. Sterman, Phys. Rev. D10: 2, 663-674 (1974).
16. CONCERNING THE EVALUATION OF MULTIPLE INTEGRALS, with C. Kacser, Am. J. Phys., 43, No. 7: (1975).
17. INSOLUBILITY OF TRAPPED PARTICLE MOTION IN A MAGNETIC DIPOLE FIELD, with J. Finn, J. Geophys. Res., 81: 2327-2340 (1976).

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19. NORMAL FORM FOR MIRROR MACHINE HAMILTONIANS, with J. Finn, J. Math. Physics, 20, 2649-2660, (1979).
20. A METHOD OF TRANSFER MAPS FOR LINEAR AND NONLINEAR BEAM ELEMENTS, IEEE Transactions on Nuclear Science, NS-26, No. 3, 3601-3603, (1979).
21. TRANSFER MAP APPROACH TO THE BEAM-BEAM INTERACTION, Nonlinear Dynamics and the Beam-Beam Interaction, pp. 143-157, M. Month and J. Herrera, Edit., American Institute of Physics Proceedings #57, (1979).
22. ANALYSIS OF THE BEAM-BEAM INTERACTION USING TRANSFER MAPS, with O. Jakubowicz. Proceedings of SLAC Symposium on the Beam-Beam Interaction, SLAC-PUB-2624, Stanford University, Stanford, California, (1980).
23. EXACT NUMERICAL CALCULATION OF CHROMATICITY IN SMALL RINGS, IEEE Transactions on Nuclear Science, NS-28, p. 2627 (1981).
24. CHARGED PARTICLE BEAM TRANSPORT USING LIE ALGEBRAIC METHODS, with D. Douglas, IEEE Transactions on Nuclear Science, NS-28, p. 2522 (1981).
25. A LIE ALGEBRAIC THEORY OF GEOMETRICAL OPTICS AND OPTICAL ABERRATIONS, J. Opt. Sci. Am. 72, p. 372 (1982).
26. EXACT NUMERICAL CALCULATION OF CHROMATICITY IN SMALL RINGS, Particle Accelerators 12, pp. 205-218 (1982).
27. LECTURES ON NONLINEAR ORBIT DYNAMICS, published in Physics of High Energy Particle Accelerators, American Institute of Physics Conference Proceedings No. 87, R.A. Carrigan et al., editors (1982).
28. LIE ALGEBRAIC METHOD FOR CHARGED PARTICLE BEAM TRANSPORT AND PARTICLE TRACKING, with D. Douglas, published in Proceedings of the Brookhaven Conference on Accelerator Orbit and Particle Tracking Programs, Brookhaven National Laboratory Report BNL-31761 (1982).
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30. MARYLIE, THE MARYLAND LIE ALGEBRAIC BEAM TRANSPORT AND PARTICLE TRACKING PROGRAM, with D. Douglas, IEEE Trans. Nuc. Sci., NS-30, p. 2442 (1983).

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56. NUMERICAL THIRD-ORDER TRANSFER MAP FOR SOLENOID, Nuclear Instruments and Methods A298, p. 441 (1990).

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58. COMPUTATION OF ERROR EFFECTS IN NONLINEAR HAMILTONIAN SYSTEMS USING LIE ALGEBRAIC METHODS, with L. Healy et al., J. Math. Phys. 33, p. 1948 (1992).
59. GENERAL MOMENT INVARIANTS FOR LINEAR HAMILTONIAN SYSTEMS, with F. Neri et al., Physical Review A, 45, p. 2572 (1992).
60. COMMENT ON ROUND-OFF ERRORS AND ON ONE-TURN TAYLOR MAPS, with Y. Yan et al., Nonlinear Problems in Future Particle Accelerators, W. Scandale and G. Turchetti, Ed., World Scientific (1991).

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63. JOLT FACTORIZATION OF SYMPLECTIC MAPS, with D.T. Abell, Int. J. Mod. Phys. A (Proc. Suppl.) 2B, p. 1019 (World Scientific, 1993).
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69. A LIE CONNECTION BETWEEN HAMILTONIAN AND LAGRANGIAN OPTICS, *Discrete Mathematics and Theoretical Computer Science, Special Issue, Lie Computations Papers* (1997).
70. COMPUTATION OF MAPS BY SCALING, SPLITTING, AND SQUARING, *Phys. Rev. Lett.* 75, p. 1946 (1995).
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72. SINGLE-PARTICLE DYNAMICS STUDY FOR THE UNIVERSITY OF MARYLAND ELECTRON RING, with M. Venturini et al., *Fusion Engineering and Design*, 32-33, 283 (1996).
73. SUMMARY OF THE WORKING GROUP ON MAPS, *Particle Accelerators* 55, p. 253 (1996).

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76. MULTI-PLATFORM GRAPHIC USER INTERFACE FOR THE MARYLIE CHARGED PARTICLE BEAM TRANSPORT CODE, with G. Gillespie et al., *Proceedings of the 1998 International Computational Accelerator Physics Conference* (1998).
77. MAP COMPUTATION FROM MAGNETIC FIELD DATA AND APPLICATIONS TO THE LHC HIGH GRADIENT QUADRUPOLES, with M. Venturini and D. Abell, *Proceedings of the 1998 International Computational Accelerator Physics Conference* (1998)
78. BEHAVIOR OF WIGNER FUNCTIONS UNDER ABERRATIONS, with S. Habib, *Proceedings of the Advanced ICFA Beam Dynamics Workshop on Quantum Aspects of Beam Physics*, P. Chen, Ed., *World Scientific* (1999).
79. TAYLOR MAPS, with J. Irwin, *Handbook of Accelerator Physics and Engineering*, A. Chao and M. Tigner, Edit., *World Scientific* (1999).
80. LIE MAPS, *Handbook of Accelerator Physics and Engineering*, A. Chao and M. Tigner, Edit., *World Scientific* (1999).
81. USING MARYLIE WITH THE PARTICLE BEAM OPTICS LABORATORY, with G. Gillespie et al., *Proceedings of the 1999 International Particle Accelerator Conference* (1999).

82. COMPUTING TRANSFER MAPS FROM MAGNETIC FIELD DATA, with M. Venturini, Proceedings of the 1999 International Particle Accelerator Conference (1999).
83. RELEASE OF MARYLIE 3.0, Proceedings of the 1999 International Particle Accelerator Conference (1999).
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88. THE PROPAGATION OF QUANTUM RELATIVISTIC WAVEPACKETS IN ELECTROMAGNETIC FIELDS, with P. Johnson, Proceedings of the 2001 International Particle Accelerator Conference (2001).
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96. MARYLIE/IMPACT: A PARALLEL 5<sup>TH</sup> ORDER BEAM OPTICS CODE WITH SPACE CHARGE, with R. Ryne, A. Adelman, P. Colella, J. Qiang, D. Serafini, R. Samulyak, S. Habib, T. Mottershead, F. Neri, P. Walstrom, and V. Decyk, Proceedings of the 2003 International Particle Accelerator Conference (2003).
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B. Books

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2. MARYLIE 3.0, A PROGRAM FOR CHARGED PARTICLE BEAM TRANSPORT BASED ON LIE ALGEBRAIC METHODS, with R. Ryne, D. Douglas et al., 900 pp. (2003).
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C. Reports

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2. LECTURE NOTES ON THE POINCARÉ GROUP AND S-MATRIX THEORY (160pp) (1971).
3. STABILITY OF CHARGED PARTICLE MOTION IN A MAGNETIC DIPOLE FIELD: A PRELIMINARY REPORT OF NUMERICAL STUDIES, with John Finn, U. of Md. Dept. of Phys. and Astron. TR #73-074 (23pp) (1971).
4. LECTURES ON LIE GROUPS (37 pp) (1972).
5. NONLINEAR RESONANCES (7 pp) (1978).
6. PROTON STORAGE RING PROJECT SUMMARY (5 pp) (1979).
7. ORBITS IN THE PROTON STORAGE RING WITH IDEAL MAGNETS (63 pp) (1979).
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10. NONLINEAR CONTROL OF RESONANT ISLAND WIDTH AND STOCHASTIC BEHAVIOIR (4 pp) (1981).
11. MAKING THE BEST OF THE LEAST (11 pp) (1982).
12. ABERRATIONS OF GENERAL LENS SYSTEMS WITH AXIAL SYMMETRY, (10 pp.) (1982).
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14. THEORY FOR A LIE ALGEBRAICALLY BASED BEAM TRANSPORT AND PARTICLE TRACKING PROGRAM, with D.R. Douglas (15 pp) (1983).
15. LECTURES ON CLASSICAL MECHANICS
16. IMPROVING LATTICE AND TRACKING CODES, prepared for Berkeley Conference on the Determination of the Dynamic Aperture for the Superconducting Super Collider (1984).

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20. USE OF MARYLIE TO COMPUTE SECOND AND THIRD ORDER ABERRATIONS, with R. Ryne (11 pp) (1986).
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22. SYMPLECTIC MAPS AND SYMPLECTIC INTEGRATION (6 pp) (1988).
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27. OPTIMIZATION OF MULTIPLE OCTUPOLE STRENGTHS FOR CORRECTION OF TELESCOPE ABERRATIONS, with C.T. Mottershead (40 pp) (1989).
28. NOTES ON SLAC FINAL FOCUS TEST BEAM, with J. van Zeijts, (17 pp) (1991).
29. CHROMATICITY OF THE LOS ALAMOS PROTON STORAGE RING, with F. Neri, (25 pp) (1992).
30. OVERVIEW OF MOMENT TRANSPORT IN ACCELERATORS, with H. Ye (1994).
31. MOMENT INVARIANTS FOR NONLINEAR HAMILTONIAN SYSTEMS, with B.M. Radak (26 pp) (1994).
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33. DESIGN OF OPTIMAL TRUNCATED POWER SERIES ALGEBRA ROUTINES: I. MONOMIAL INDEXING SCHEMES AND LINKED LISTS, with D.T. Abell and H. Ye, (85 pp) (1996).
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39. NOTES ON THE EUCLIDEAN GROUP, (6 pp)(1998).
40. CREMONA TRACKING APPLIED TO THE LARGE HADRON COLLIDER, with D. Abell and F. Schmidt (1998).
41. SUMMARY OF WORKING GROUP D, with M. Pusterla (8 pp) (2000).
42. COMPUTATION OF CHARGED-PARTICLE TRANSFER MAPS FOR GENERAL FIELDS AND GEOMETRIES USING ELECTROMAGNETIC BOUNDARY-VALUE DATA, with P. Walstrom et al., (20 pp) (2000).
43. 2001 SNOWMASS ACCELERATOR R&D REPORT, with A. Chao et al., (65 pp) (2001).
44. QUANTUM COMPUTING, (28 pp) (2002).
45. SOME NOTES ON NUMBER THEORY AND PUBLIC KEY CRYPTOGRAPHY, (22 pp) (2002).

Alex J. Dragt

Bibliography (continued)

D. Papers presented at scientific meetings

1. Invited papers

INJECTION OF PROTONS INTO THE VAN ALLEN RADIATION BY COSMIC RAY AND SOLAR PROTON ALBEDO NEUTRON DECAY, with R. White and M. Austin. COSPAR meeting, Florence, Italy, 1964.

NORMAL FORMS FOR MIRROR MACHINE HAMILTONIANS AND STOCHASTIC BEHAVIOR, Conference on Stochastic Behavior in Classical and Quantum Hamiltonian Systems, Como, Italy, 1977.

ADIABATIC INVARIANTS AND STOCHASTICITY IN THE VAN ALLEN RADIATION, N.C. Christophilos International Summer School and Conference in Plasma Physics, Spetses, Greece, 1977.

TRANSFER MAP APPROACH TO THE BEAM-BEAM INTERACTION, Conference on the Beam-Beam Interaction, Brookhaven National Laboratory, New York 1979.

LIE ALGEBRAS AND DYNAMICAL SYSTEMS, invited talk given at annual summer meeting of Canadian Mathematical Society, Saskatoon, Canada, May 1979.

ANALYSIS OF THE BEAM-BEAM INTERACTION USING TRANSFER MAPS, Stanford Symposium on the Beam-Beam Interaction, 1980.

NONLINEAR CONTROL OF RESONANCES AND STOCHASTIC BEHAVIOR, Texas conference on stability and long time behavior, 1981.

NONLINEAR ORBIT DYNAMICS, a set of six invited lectures at the Fermilab international summer school on High Energy Particle Accelerators, 1981.

THEORY FOR A LIE ALGEBRAIC PARTICLE TRACKING PROGRAM, Brookhaven Conference on Accelerator Orbit and Particle Tracking Programs, 1982.

LIE ALGEBRAS, PARTICLE ACCELERATORS, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at XIIIth International Colloquium on Group Theoretical Methods in Physics, May 1984.

LONG TERM PARTICLE TRACKING USING PARALLEL PROCESSING, presented at Fermilab International Summer School on High Energy Particle Accelerators, August 1984.

A LIE ALGEBRAIC APPROXIMATION TO ETERNITY, presented at Gordon Research Conference on Dynamics of Simple Systems in Chemistry and Physics, August 1984.

FOUNDATIONS OF LIE ALGEBRAIC METHODS IN LIGHT OPTICS, presented at Centro Internacional de Fisica y Mathematicas Orientadas and Centro de Investigaciones en Optica Workshop on Lie Methods in Optics, Leon, Mexico, January 1985.

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Bibliography (continued)

1. Invited Papers (continued)

INTEGRATION MODELS IN ACCELERATORS, presented at Workshop on Orbital Dynamics and Applications to Accelerators, University of California at Berkeley, March 1985.

LIE ALGEBRAIC METHODS FOR COMPUTING CHARGED PARTICLE BEAM TRANSPORT, presented at Sherwood Plasma Physics Theory Conference, April 1985.

LIE ALGEBRAS AND THE SUPERCONDUCTING SUPER COLLIDER, presented at 24th Eastern Theoretical Physics Conference, October 1985.

LIE ALGEBRAIC METHODS FOR LIGHT OPTICS, ELECTRON MICROSCOPES, AND ACCELERATOR DESIGN, presented at the Second International Conference on Charged Particle Optics, Albuquerque, New Mexico, May 1986.

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE BEAM TRANSPORT, presented at La Jolla Institute Workshop on Accelerator Codes, La Jolla, California, May 1987.

INTEGRABILITY IN ACCELERATORS, presented at Third Florida Workshop in Nonlinear Astronomy, University of Florida, Gainesville, Florida, September 1987.

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE OPTICS, presented at the Second La Jolla Institute Workshop on Accelerator Codes, La Jolla, California, January 1988.

SYMPLECTIC MAPS AND SYMPLECTIC INTEGRATION, presented at Los Alamos Workshop on Symplectic Integration Algorithms, Los Alamos, New Mexico, March 1988.

THEORY OF EMITTANCE INVARIANTS, presented at the joint US-CERN School on Accelerator Physics, Capri Italy, October 1988.

LIE ALGEBRAIC METHODS FOR HAMILTONIAN SYSTEMS, presented at Conference on Dynamical Systems, Cornell University, November 1989.

SYMPLECTIC TRACKING, presented at the International Workshop on Nonlinear Dynamics Problems in Future Particle Accelerators, Capri Italy, May 1990.

NUMERICAL THIRD-ORDER TRANSFER MAP FOR SOLENOID, presented at the Third International Conference on Charged Particle Optics, Toulouse France, May 1990.

AN INTRODUCTION TO LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, presented at the Society for Industrial and Applied Mathematics Conference on Dynamical Systems, Orlando Florida, May 1990.

THEORY OF EMITTANCE INVARIANTS, presented at the Symposium on High Brightness Beams for Advanced Accelerator Applications, University of Maryland, June 1991.

Alex J. Dragt

Bibliography (continued)

1. Invited Papers (continued)

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE BEAM TRANSPORT, presented at the Symposium on Charged Particle Beam Optics, Los Alamos National Laboratory, August 1991.

NONLINEAR ORBIT THEORY AND ACCELERATOR DESIGN, presented at the Symposium on Accelerator Physics and Modeling, Brookhaven National Laboratory, September 1991.

LONG-TERM BEHAVIOR OF NONLINEAR HAMILTONIAN SYSTEMS, presented at American Physical Society Division of Nuclear Physics, post-conference workshop on Nonlinear Dynamics in Nuclear and Accelerator Physics, Michigan State University, October 1991.

THEORY OF COMPLETE THIRD ORDER ACHROMAT, presented at American Physical Society meeting, April 1992.

LIE ALGEBRAIC METHODS IN LIGHT AND PARTICLE OPTICS, presented at International Conference on Computer Methods for Partial Differential Equations, Rutgers University, June 1992.

MAP METHODS AND TRACKING, presented at Brookhaven International Workshop on the Stability of Particle Motion in Storage Rings, October 1992.

BEAM DYNAMICS IN PARTICLE ACCELERATORS, presented at Fields Mathematics Institute International Workshop on Integration Algorithms for Classical Mechanics, October 1993.

LIE ALGEBRAIC METHODS FOR MAPS, presented at Ninth University of Florida (Gainesville) Workshop on Nonlinear Problems in Astronomy, October 1993.

LIE METHODS FOR RAY AND WAVE LIGHT OPTICS, presented at "Ettore Majorana" Center for Scientific Culture, Erice, Italy, June 1994.

SYMPLECTIC MAPS AND COMPUTATION OF ORBITS IN PARTICLE ACCELERATORS, presented at 14th World Congress of the International Association for Mathematics and Computers in Simulation (IMACS) on Computation and Applied Mathematics, Georgia Institute of Technology, July 1994.

LIE METHODS FOR RAY AND WAVE OPTICS, presented at the 4th International Charged Particle Optics Conference, Tsukuba, Japan, October 1994.

OVERVIEW OF LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, presented at 14th Conference on Charged Particle Accelerators, Protvino, Moscow Region, Russia, October 1994.

Alex J. Dragt

Bibliography (continued)

1. Invited Papers (continued)

LIE METHODS FOR RAY AND WAVE OPTICS, presented at Computer Algebra Netherlands Conference on Lie Methods in Optics, Amsterdam, Netherlands, November 1994.

Same as above, presented at International Workshop on Lie Computations, Marseille, France, November 1994.

AN OVERVIEW OF MAP METHODS FOR ACCELERATOR PHYSICS, presented at an International Workshop on the Large Hadron Collider, Montreux, Switzerland, October 1995.

REPRESENTATION AND INTERATION OF MAPS, presented at the May 1996 meeting of the American Physical Society (Minisymposium on Nonlinear Dynamics of Beams).

OPTIMAL TRUNCATED POWER SERIES ALGORITHMS, presented at the Computational Accelerator Physics Conference, Williamsburg, VA, September 1996.

CREMONA MAP METHODS, presented at the Advanced Methods in Accelerator Physics Conference, Santa Barbara, CA, December 1996.

LIE ALGEBRAIC METHODS FOR LIGHT AND CHARGED PARTICLE OPTICS, presented at the International Conference on Dynamical Systems, Bangalore, India, January 1997.

LECTURES ON LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, presented at the Indian Winter School for Accelerator Physics, Indore, India, January 1997.

LIE ALGEBRAIC METHODS FOR RAY AND WAVE LIGHT OPTICS, presented at International Workshop on Quantum Aspects of Beam Physics, Monterey, CA, January 1998.

LONG-TERM STABILITY OF ORBITS IN HIGH-ENERGY ACCELERATORS, presented at Thirteenth Annual International Workshop in Nonlinear Astronomy and Physics, University of Florida, Gainesville, FL, February 1998.

SYMPLECTIC CLASSIFICATION AND DECOMPOSITION OF ANALYTIC VECTOR FIELDS, presented at the 18th Advanced ICFA Beam Dynamics Workshop on Quantum Aspects of Beam Physics, Capri, Italy (2000).

REPRESENTATIONS OF THE SYMPLECTIC GROUP WITH APPLICATIONS TO ACCELERATOR PHYSICS, presented at the 2001 Snowmass Workshop on the future of Particle Physics, Snowmass CO, July 2001.

COMPUTATION OF TRANSFER MAPS FROM BOUNDARY FIELD DATA, presented at the 2001 Snowmass Workshop on the future of Particle Physics, Snowmass CO, July 2001.

LONG-TERM TRACKING OF THE LHC USING CREMONA MAPS, presented at the 2001 Snowmass Workshop on the future of Particle Physics, Snowmass CO, July 2001.

LIE METHODS IN ACCELERATOR PHYSICS, presented at the American Physical Society  
Division of Plasma Physics Annual Meeting, November 2002.



Alex J. Dragt

Bibliography (continued)

2. Colloquia

CHAOS STARTING FROM  $F=MA$ , presented at the Johns Hopkins Applied Physics Laboratory, March 1977.

THE VAN ALLEN RADIATION: AN EXAMPLE OF AN INSOLUBLE MIRROR MACHINE, presented at Department of Physics, University of California, Los Angeles, October 1977.

Same as above. Presented at Department of Physics, University of California at Berkeley, October 1977.

POINCARÉ MAPS, LIE SERIES, NORMAL FORMS, AND INSOLUBILITY IN CLASSICAL MECHANICS, presented jointly to the Department of Mathematics, the Department of Physics, and the Institute for Theoretical Physics of the State University of New York at Stony Brook, December 1977.

TRANSFER MAP METHODS, presented to the SPEAR and PEP storage ring theory groups of SLAC, Stanford University, January 1979.

LIE ALGEBRAIC METHODS IN CLASSICAL MECHANICS, presently jointly to the Physics and Mathematics Departments of the University of New Mexico, April 1979.

LECTURES ON CONTEMPORARY CLASSICAL MECHANICS, a course presented at the Los Alamos National Laboratory in Spring 1979.

LIE ALGEBRAS, OPTICS, AND PARTICLE ACCELERATORS, presented at the University of Maryland, October 1979.

CHAOS STARTING FROM  $F = MA$ , presented at Department of Physics, University of Alabama at Birmingham, March 1980.

OPTICAL ABERRATION THEORY AND LIE TRANSFORMATIONS, presented at Los Alamos National Laboratory, July 1980.

LIE ALGEBRAS AND SYMPLECTIC MAPS WITH APPLICATIONS TO DYNAMICAL SYSTEMS AND OPTICS, presented at Princeton University, October 1980.

LIE ALGEBRAIC METHODS FOR COMPUTING CHARGED PARTICLE BEAM TRANSPORT, presented at University of Virginia, February 1981.

Same as above. Presented at Kirtland Air Force Base, Albuquerque, New Mexico, March 1981.

Same as above. Presented at Naval Research Laboratory, Washington, D.C., September 1981.

Alex J. Dragt

Bibliography (continued)

2. Colloquia (continued)

HAMILTONIAN FLOWS, SYMPLECTIC MAPS, AND THE FACTORIZATION OF SYMPLECTIC MAPS, presented at University of Maryland Institute for Physical Sciences and Technology Applied Dynamics Seminar, April 1982.

ADVANCES IN MARYLIE, A PROGRAM FOR COMPUTING CHARGED PARTICLE BEAM TRANSPORT, Presented at Los Alamos National Laboratory, Los Alamos, New Mexico, January 1983.

CHARGED PARTICLE TRACKING USING LIE ALGEBRAIC METHODS, Presented at Los Alamos National Laboratory, Los Alamos, New Mexico, May 1983.

SYMPLECTIC MAPS, LIE ALGEBRAS, PARTICLE ACCELERATORS, presented at Lewes Center for Physics of the University of Delaware, July 1983.

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE BEAM TRANSPORT, presented at Physikalisches Institut, Justus-Liebig Universitat, Giessen, Germany, September 1983.

LIE ALGEBRAS, PARTICLE ACCELERATORS, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at Department of Physics, Yale University, December 1983.

CALCULATION OF CHARGED PARTICLE BEAM TRANSPORT USING LIE ALGEBRAIC METHODS, presented at Department of Electrical Engineering, University of Maryland, December 1983.

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE TRACKING AND ACCELERATORS, presented at Superconducting Super Collider Workshop held at University of Michigan, December 1983.

Same as above. Presented at Department of Physics, Texas A&M University, December 1983.

LIE ALGEBRAS, PARTICLE ACCELERATORS, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at Department of Mathematics, University of New Mexico, Albuquerque, January 1984.

Same as above. Presented at Centre de Recherche de Mathematiques Appliquees, Universite de Montreal, February 1984.

Same as above. Presented at Department of Physics, University of North Carolina at Chapel Hill, February 1984.

Same as above. Presented at Naval Research Laboratory, Washington, D.C., February 1984.

FAST AND HIGH-ORDER LIE ALGEBRAIC METHODS FOR PARTICLE TRACKING USING IMPROVED ALGORITHMS AND PARALLEL PROCESSING, presented at University of California Lawrence Berkeley Laboratory, March 1984.

Alex J. Dragt

Bibliography (continued)

2. Colloquia (continued)

Same as above. Presented at Stanford University Linear Accelerator Center, March 1984.

Same as above. Presented at American Physical Society Division of Particles and Fields Summer Study on the Design and Utilization of the Superconducting Super Collider, Snowmass, Colorado, July 1984.

LIE ALGEBRAS, PARTICLE ACCELERATORS, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at Mathematics Department, Texas A&M University, October 1984.

Same as above. Presented at the Institute for Fusion Studies, University of Texas at Austin, October 1984.

LIE ALGEBRAIC THEORY OF CHARGED PARTICLE OPTICS AND ELECTRON MICROSCOPES, presented at the RCA David Sarnoff Research Center, Princeton, New Jersey, February 1985.

A LIE ALGEBRAIC APPROXIMATION TO ETERNITY, presented at Brown University, Providence, Rhode Island, March 1985.

FOUNDATIONS OF A LIE ALGEBRAIC THEORY OF GEOMETRICAL OPTICS, presented at the University of California at Berkeley, September 1985.

LIE ALGEBRAS AND THE SUPERCONDUCTING SUPER COLLIDER, presented at the University of California at Berkeley, October 1985.

LIE ALGEBRAS, PARTICLE ACCELERATORS, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at Virginia Polytechnic Institute and State University, Blacksburg, Virginia, October 1985.

Same as above. Presented at University of the Pacific, Stockton, California, November 1985.

SIMPLE MAPS, FRACTALS, AND CELLULAR AUTOMATA, presented at the Lawrence Berkeley Laboratory, Berkeley, California, November 1985.

A LIE ALGEBRAIC THEORY OF CHARGED PARTICLE BEAM OPTICS AND ELECTRON MICROSCOPES, presented at the Lawrence Berkeley Laboratory, Berkeley, California, December 1985.

ADVANCED METHODS FOR LIE ALGEBRAIC ANALYSIS OF MAPS, presented at the Los Alamos National Laboratory, January 1986.

LIE ALGEBRAS, LIGHT OPTICS, ELECTRON MICROSCOPES, AND PARTICLE ACCELERATORS, presented at the Texas Accelerator Center, February 1986.

Same as above. Presented at Stevens Institute of Technology, March 1986.

Same as above. Presented at Michigan State University, April 1986.

Same as above. Presented at the University of Florida, March 1986.

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Bibliography (continued)

2. Colloquia (continued)

LIE ALGEBRAIC APPROXIMATION OF ETERNITY, presented at Los Alamos National Laboratory, December 1986.

A MARYLIE 3.0 TUTORIAL, presented at Los Alamos National Laboratory, January 1987.

LIE ALGEBRAS, LIGHT OPTICS, ELECTRON MICROSCOPES, AND PARTICLE ACCELERATORS, presented at Columbia University, April 1988.

Same as above. Presented at Naval Research Laboratory, November 1988.

LIE ALGEBRAIC METHODS FOR HIGH ENERGY ACCELERATOR DESIGN, presented to University of Maryland Mathematics Department, November 1990.

DESIGN OF THIRD ORDER ACHROMATS, presented at Stanford Linear Accelerator Center, December 1990.

THEORY OF A COMPLETE THIRD ORDER ACHROMAT, presented at Fermi National Laboratory, April 1991.

Same as above, presented at Los Alamos National Laboratory, May 1991.

A CLASSICAL MECHANIC LOOKS AT THE SSC, presented to Rutgers University Physics Department, October 1991.

LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE OPTICS, presented at Columbia University Physics Department, May 1992.

LIE ALGEBRAIC METHODS FOR LIGHT AND CHARGED PARTICLE OPTICS, presented at State University of New York (Stony Brook) Physics Department, October 1992.

LIE ALGEBRAIC THEORY OF RAY AND WAVE OPTICS, presented at Los Alamos National Laboratory, November 1992.

Same as above, presented at Superconducting Super Collider Laboratory, April 1993.

MOMENT INVARIANTS FOR LINEAR AND NONLINEAR SYMPLECTIC MAPS, presented at KEK National Laboratory for High Energy Physics, Tsukuba, Japan, October 1994.

ANALYTIC PROPERTIES OF TRANSFER MAPS, presented at KEK National Laboratory for High Energy Physics, Tsukuba, Japan, October 1994.

AN OVERVIEW OF LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, a series of five 1 and 1/2 hour lectures presented at KEK National Laboratory for High Energy Physics, Tsukuba, Japan, October 1994.

LIE ALGEBRAIC THEORY OF RAY AND WAVE OPTICS, presented at Ecole Polytechnique, Palaseau, France, November 1994.

SYMPLECTIC COMPLETION OF SYMPLECTIC JETS, presented at Henri Poincare Institute, Paris, France, November 1994.

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Bibliography (continued)

2. Colloquia (continued)

CREMONA SYMPLECTIFICATION OF TAYLOR MAPS, presented at Los Alamos National Laboratory, Los Alamos, New Mexico, January 1995.

LIE ALGEBRAIC THEORY OF RAY AND WAVE OPTICS, presented at University of California Berkeley, Physics Department, February 1995.

Same as above, presented at Stanford Linear Accelerator Center, February 1995.

MOMENT INVARIANTS FOR LINEAR AND NONLINEAR HAMILTONIAN SYSTEMS, presented at Stanford Linear Accelerator Center, March 1995.

CREMONA SYMPLECTIFICATION OF TAYLOR MAPS, presented at Stanford Linear Accelerator Center, March 1995.

Same as above, presented at KEK National Laboratory for High Energy Physics, Tsukuba, Japan, March 1995.

COMPUTATION OF MAPS BY SCALING, SPLITTING, AND SQUARING, presented at KEK National Laboratory for High Energy Physics, Tsukuba, Japan, March 1995.

MOMENT INVARIANTS FOR LINEAR AND NONLINEAR HAMILTONIAN SYSTEMS, presented at Lawrence Berkeley Laboratory, April 1995.

LIE ALGEBRAIC THEORY OF RAY AND WAVE OPTICS, presented at Lawrence Berkeley Laboratory, April 1995.

Same as above, presented at the CERN Laboratory, Geneva, Switzerland, October 1995.

OPTIMAL ALGORITHMS FOR THE CLASSIC PROJECT, presented at the Los Alamos National Laboratory, January 1996.

LIE ALGEBRAS IN MODERN CLASSICAL MECHANICS, presented at the University of California, Santa Barbara, Institute for Theoretical Physics, December 1996.

LECTURES ON LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, presented at the Indian Winter School for Accelerator Physics, Indore, India, January 1997.

LIE ALGEBRA, ACCELERATOR DESIGN, ELECTRON MICROSCOPES, AND LIGHT OPTICS, presented at University of New Mexico, Albuquerque, NM, March 1998.

TWO LECTURES ON THE SYMPLECTIC CLASSIFICATION AND DECOMPOSITION OF ANALYTIC VECTOR FIELDS, presented at the Los Alamos National Laboratory, Los Alamos, NM, August 2000.

COMPUTATION OF HIGH-ORDER TRANSFER MAPS FOR GENERAL GEOMETRIES USING BOUNDARY-VALUE DATA, presented at the Stanford Linear Accelerator Center, Stanford, CA, November 2000.

Same as above, presented at Fermilab, February 2001.

Alex J. Dragt

Bibliography (continued)

2. Colloquia (continued)

INTRODUCTION TO QUANTUM COMPUTING, presented at Los Alamos National Laboratory, Los Alamos, NM, March 2001.

Same as above. Presented at the Lawrence Berkeley National Laboratory, May 2002.

IMPORTANCE OF THE SYMPLECTIC GROUP FOR CLASSICAL MECHANICS, presented at the Lawrence Berkeley National Laboratory, February 2002.

Same as above. Presented at the Stanford Linear Accelerator Center, March 2002.

OCTUPOLE CORRECTION OF SPHERICAL ABERRATION, presented at the Lawrence Berkeley National Laboratory, March 2002.

COMPUTATION OF TRANSFER MAPS FROM BOUNDARY FIELD DATA, presented at the Lawrence Berkeley National Laboratory, April 2002.

Alex J. Dragt

Theses Directed

A. M.S. Theses

Steven Gold	M.S., June 1970	Non-Thesis Research paper: "Dynamical Scaling Laws."
William Eichhorn	M.S., June 1971	"Determination of the Magnetic Dipole Moment of a Macroscopic Source by Near Field Analysis."
Patrick Roberts Potential	M.S., June 2000	"Computation of Interior Vector from Magnetic Field Boundary Values. "
William Farrell SQUID: A	M.S., June 2000	"Quantum Theory of the rf Quantum Qubit. "
Timothy Stasevich	M.S. June 2001	"Computing Transfer Maps from Magnetic Boundary Field Data."

B. Ph.D. Theses

Brian Beers Production	Ph.D., January 1970	"Some Aspects of Simple Amplitudes."
John Finn	Ph.D., August 1974	"Integrals of Canonical Transformations and Normal Forms for Mirror Machine Hamiltonians."
George Sterman	Ph.D., August 1974	"Part I: Some Aspects of the S-Wave Fermion-Scalar Bound State in the Bethe-Salpeter Ladder Model. Part II: Rotational Analyticity of the S-Matrix."
David Douglas	Ph.D., August 1982	"Lie Algebraic Methods for Particle Accelerator Theory."
Etienne Forest	Ph.D., August 1984	"Lie Algebraic Methods for Charged Particle Beams and Light Optics."
Liam Healy	Ph.D., August 1986	"Lie Algebraic Methods for Treating Lattice Parameter Errors in Accelerators."



Robert Ryne	Ph.D., December 1987	"Lie Algebraic Treatment of Space Charge."
Govindan Rangarajan	Ph.D., December 1990	"Invariants for Symplectic Maps and Symplectic Completion of Symplectic Jets."

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Thesis Directed (Continued)

B. Ph.D. Theses (Continued)

Dan Abell	Ph.D., December 1995	"Analytic Properties and Cremona Approximation of Transfer Maps for Hamiltonian Systems."
Marco Venturini	Ph.D., December 1998	"Lie Methods, Exact Map Computation, and the Problem of Dispersion in Space Charge Dominated Beams."

C. Current Students

Frederick Strauch

Fifth-year graduate student and Graduate Research Assistant.

Carrying out Ph.D. theoretical thesis research in the area of Quantum Computing.

Chad Mitchell

Fourth-year graduate student and Graduate Research Assistant.

Carrying out Ph.D. theoretical thesis research in the area of Accelerator Physics.

Matthew Cornick

Second-year graduate student, Department Fellow, and Graduate Research Assistant.

Carrying out preliminary research in the area of Accelerator Physics.

Alex J. Dragt

### Grants, Contracts, and Awards

NSF grant GP-418-22X on "Foundations of relativistic quantum theory, interactions of hadrons, and electromagnetic interactions of elementary systems." (Co-principal investigator with J. Sucher.) \$59,900 for 1974.

NSF grant renewed 1975 for \$64,000.

NSF grant renewed 1976 for \$57,900.

NSF grant renewed 1977 for \$60,850.

Air Force Office of Scientific Research contract F44620-76-C-0074, "Review and Evaluation of Physical Sciences Program." \$87,126 for 1977-79.

Air Force Office of Scientific Research contract renewed in 1979 for \$60,000.

Air Force Office of Scientific Research contract renewed in 1980 for \$100,000.

Department of Energy contract DE-AS05-80ERI0666.A000, "Transfer Map Methods for Computing Particle Beam Transport in Linear and Nonlinear Elements", \$38,000 for 1980.

Air Force Office of Scientific Research contract renewed in 1981 for \$80,000, and subsequently supplemented to bring total support for year to \$102,520.

Department of Energy contract renewed in 1981 for \$48,000.

Department of Energy contract DE-AS05-80ER10666.A2 "Advanced Methods for the Computation of Particle Beam Transport and the Computation of Complicated Electromagnetic Fields in Cavities and Magnets" (with R. Gluckstern as co-principal investigator) awarded in 1982 for \$212,000 for 18 months.

Air Force Office of Scientific Research contract renewed in 1982 for \$84,393, and subsequently supplemented to bring total support for year to \$123,793.

Air Force Office of Scientific Research contract renewed in 1983 for \$90,376, and subsequently supplemented to bring total support for year to \$200,376.

Department of Energy contract renewed in 1983 for \$440,000 for two years.

Air Force Office of Scientific Research contract renewed in 1985 for \$683,250 for 3 years. Subsequently supplemented to bring total support for 3 year period to \$788,000.

Department of Energy contract renewed in 1986 for \$945,000 for three years.

Department of Energy contract renewed in 1989 for \$1,185,000 for three years.

SSC Laboratory Fellowship for 1991-1992, \$57,234.

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Grants, Contracts, and Awards (continued)

Department of Energy grant renewed in 1992 for \$1,340,000 for three years.

Department of Energy grant renewed in 1995 for \$1,320,000 for three years.

Department of Energy grant renewed in 1998 for \$1,240,000 for three years.

National Security Agency grant (with J. Anderson, C. Lobb, and F. Wellstood) received in 1999 for \$1,929,000 for four years.

Department of Energy SciDAC grant received in 2001 for \$50,000 for 6 months. Maryland portion of a multiuniversity and multilaboratory consortium funded at \$2.5 million/year.

Department of Energy grant renewed in 2001 for \$1,087,857 for three years.

Department of Energy SciDAC grant received in 2003 for \$50,000 for 6 months. Maryland portion of a multiuniversity and multilaboratory consortium funded at \$2.5 million/year.

National Science Foundation grant (with J. Anderson, C. Lobb, and F. Wellstood) received in 2003 for \$692,230 for three years.

Alex J. Dragt

Professional Service

- 1983-84 Organizing Committee for 1984 International Summer School on High Energy Particle Accelerators.  
Organizing Committee for 13'th International Colloquium on Group Theoretical Methods in Physics (Co-Chairman).  
Organizing Committee for 1985 International Summer School on High Energy Particle Accelerators.
- 1984-85 Organizing Committee for Berkeley Conferences on Determination of the Dynamic Aperture for the Superconducting Super Collider.  
Group Leader of Conference Task Force on Improving Tracking Computations and Codes.  
Organizing Committee for the Spring 1984 Berkeley Workshop on Particle Tracking in Accelerators.  
Organizing Committee for 1985 International Summer School on High Energy Particle Accelerators.  
Physics Advisory Panel on Fulbright Awards and Fellowships.
- 1985-86 Organizing Committee for Berkeley Conferences on Determination of the Dynamic Aperture for the Superconducting Super Collider.  
Group Leader of Conference Task Force on Improving Tracking Computations and Codes.  
Organizing Committee for Second International Conference on Charged Particle Optics.  
Chairman, Physics Advisory Panel on Fulbright Awards and Fellowships.  
Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Accelerator Physics Group Leader for 1986 Snowmass Study on the Physics of the Superconducting Super Collider.  
Editor for Physica D.
- 1986-87 Chairman, Physics Advisory Panel on Fulbright Awards and Fellowships.  
Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Accelerator Physics Group Leader for 1986 Snowmass Study on the Physics of the Superconducting Super Collider.  
Editor for Physica D.
- 1987-88 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Department of Energy Advisory Panel on Computer Networking.  
University of Chicago Argonne National Laboratory Review Committee.  
Editor for Physica D.
- 1988-89 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
University of Chicago Argonne National Laboratory Review Committee.  
Editor for Physica D

Alex J. Dragt

Professional Service (continued)

- 1989-90 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
University of Chicago Argonne National Laboratory Review Committee.  
Editor for Physica D.
- 1990-91 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Los Alamos National Laboratory Review Committee.  
Stanford Linear Accelerator Center Review Committee.  
Joint US-CERN Accelerator School Advisory Committee.  
American Physical Society Thesis Award Committee.  
Editor for Physica D.
- 1991-92 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Los Alamos National Laboratory Review Committee.  
Joint US-CERN Accelerator School Advisory Committee.  
American Physical Society Thesis Award Committee (Chairman).  
Program Organizing Committee for American Physical Society Division of  
Physics of Beams  
Editor for Physica D.
- 1992-93 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Joint US-CERN Accelerator School Advisory Committee.  
American Physical Society Thesis Award Committee (Chairman).  
Program Organizing Committee for 1993 Computational Accelerator Physics  
Conference.  
Program Organizing Committee for Brookhaven International Workshop on the  
Stability of Particle Motion in Storage Rings.  
Program Organizing Committee for Fourth International Conference on Charged  
Particle Beam Optics.  
Editor for Physica D.
- 1993-94 Department of Energy Advisory Panel on Accelerator Physics Computer Codes.  
Joint US-CERN Accelerator School Advisory Committee.  
Program Organizing Committee for Fourth International Conference on Charged  
Particle Beam Optics.  
Invited Panel Member on Future Directions in Artificial Satellite Theory held at  
joint Navy-Air Force Workshop on Artificial Satellite Theory.
- 1994-95 Council Delegate of the American Association for the Advancement of Science  
Section on Physics.  
Leader of Working Group on Map Methods for Accelerator Physics, International  
Workshop on Large Hadron Colliders, Montreux, Switzerland.  
Co-Organizer of University of California Santa Barbara Institute for Theoretical  
Physics 1996 Semester on New Ideas for Accelerator Physics.

Alex J. Dragt

Professional Service (continued)

- 1995-96 Council Delegate of the American Association for the Advancement of Science Section on Physics.  
Co-Organizer of University of California Santa Barbara Institute for Theoretical Physics 1996 Semester on New Ideas for Accelerator Physics.  
Program Committee for 1996 Computational Accelerator Physics Conference.  
Department of Energy Review Committee for Fermilab Recycler.
- 1996-97 Council Delegate of the American Association for the Advancement of Science Section on Physics.  
International Advisory Committee for International Conference on Dynamical Systems, Bangalore India, January 1997.  
Member at Large, American Physical Society Division of Physics of Beams Executive Committee.  
Program Committee for International Conference on Quantum Aspects of Beam Physics.
- 1997-98 Council Delegate of the American Association for the Advancement of Science Section on Physics.  
Member at Large, American Physical Society Division of Physics of Beams Executive Committee.  
Program Committee for International Conference on Quantum Aspects of Beam Physics.  
American Physical Society Selection Committee for the Outstanding Doctoral Thesis in Beam Physics Award.  
Co-Organizer of Fifth International Conference on Charged Particle Optics.  
Advisory Committee for Thirteenth Annual International Workshop in Nonlinear Astronomy and Physics.  
Department of Energy Review Committee for the CERN Large Hadron Collider.  
Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
Advisory Committee for 1998 International Computational Accelerator Physics Conference.
- 1998-99 Member at Large, American Physical Society Division of Physics of Beams Executive Committee.  
Co-Organizer of Fifth International Conference on Charged Particle Optics.  
Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
Department of Energy Advisory Committee on High Performance Computing.  
International Advisory Committee for 2000 International Computational Accelerator Physics Conference.  
Program Committee of Second International Workshop on Quantum Aspects of Beam Physics.  
Department of Energy Review Committee for Stanford Linear Accelerator Center Next Linear Collider R&D Program.

Alex J. Dragt

Professional Service (continued)

- 1999-00 Vice-Chair of American Physical Society Division of Physics of Beams Executive Committee.  
 Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
 Department of Energy Advisory Committee on High Performance Computing.  
 International Advisory Committee for 2000 International Computational Accelerator Physics Conference.  
 Advisory Committee for 2001 Particle Accelerator Conference.  
 Program Committee of Second International Workshop on Quantum Aspects of Beam Physics.
- 2000-01 Chair Elect of American Physical Society Division of Physics of Beams Executive Committee.  
 Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
 Department of Energy Advisory Committee on High Performance Computing.  
 International Advisory Committee for 2000 International Computational Accelerator Physics Conference.  
 Advisory Committee for 2001 Particle Accelerator Conference.  
 Program Committee of Second International Workshop on Quantum Aspects of Beam Physics.  
 Organizing Committee for 2001 Snowmass Summer Study on the Future of Particle Physics.  
 Organizing Committee for 2002 International Charged Particle Optics conference.
- 2001-02 Chair of American Physical Society Division of Physics of Beams Executive Committee.  
 Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
 Organizer for Division of Physics of Beams portion of Spring 2002 Albuquerque American Physical Society Meeting.  
 Organizing Committee for 2002 Next Linear Collider Conference.  
 International Advisory Committee for 2002 International Computational Accelerator Physics Conference.  
 Program Committee of Third International Workshop on Quantum Aspects of Beam Physics.  
 Organizing Committee for 2002 International Charged Particle Optics conference.
- 2002-03 Chair of American Physical Society Division of Physics of Beams Executive Committee.  
 Editorial Board, Physical Review Special Topics - Accelerators and Beams.  
 International Advisory Committee for 2002 International Computational Accelerator Physics Conference.  
 Program Committee of Third International Workshop on Quantum Aspects of Beam Physics.



Organizing Committee for 2002 International Charged Particle Optics conference.

2003-04

Past Chair of American Physical Society Division of Physics of Beams Executive Committee.

International Advisory Committee for 2004 International Computational Accelerator Physics Conference.

Alex J. Dragt

Professional Service (continued)

2004-05      High Energy Physics Advisory Panel (HEPAP).  
International Advisory Committee for 2005 International Computational  
Accelerator Physics Conference.  
Program Committee for 2005 International Particle Accelerator Conference.

Alex J. Dragt

Service Activities

A. University

- |         |   |
|---------|---|
| 1967-68 | Senate Committee on Libraries   |
| 1968-69 | Senate Committee on Libraries<br>Committee on Research in the Improvement of Teaching   |
| 1969-70 | Senate Committee on Libraries<br>Committee on Research in the Improvement of Teaching   |
| 1970-71 | E.E.E.O Department Faculty Representative<br>University Senate<br>Arts and Sciences Academic Council<br>Chancellor's Committee to Search for a University Human Relations Director  |
| 1971-72 | E.E.E.O Department Faculty Representative<br>University Senate<br>Arts and Sciences Academic Council<br>Ad Hoc Committee to hear the appeal of Dr. Cussler (Chairman)<br>Dr. Bratton's Special Committee on Student Life                                      |
| 1972-73 | On leave  |
| 1973-74 | MPSE Division Council<br>Departmental Representative on the Users' Committee of the Computer<br>Science Center  |
| 1974-75 | MPSE Division Administrative Review Committee<br>MPSE Division Unit Review Committee for Physics and Astronomy<br>Department Representative on the Users' Committee of the Computer Science<br>Center<br>MPSE Division Computer Terminal Committee (Chairman) |
| 1975-76 | Search Committee for Vice Chancellor for Academic Affairs<br>MPSE Division Computer Terminal Committee  |
| 1976-77 | Search Committee for Vice Chancellor for Academic Affairs<br>MPSE Division Computer Terminal Committee<br>Search Committee for Dean of College of Engineering (Chairman)  |
| 1977-78 | MPSE Division Computer Terminal Committee   |
| 1978-79 | On leave  |
| 1979-80 | Chancellor's Advisory Committee on Academic Computing (Chairman)  |



Alex J. Dragt

Service Activities (continued)

A. University (continued)

- |                |  |
|----------------|--|
| 1980-81        | Chancellor's Advisory Committee on Academic Computing (Chairman)<br>President's Advisory Committee on Academic Computing<br>Institute for Physical Sciences & Technology Advisory Committee  |
| 1981-82        | Chancellor's Advisory Committee on Academic Computing<br>President's Advisory Committee on Academic Computing<br>Ad Hoc Computer Science Center Advisory Committee (Chairman)<br>Committee on Honors and Prizes<br>Institute for Physical Sciences & Technology Advisory Committee   |
| 1982-83        | Chancellor's Advisory Committee on Academic Computing<br>President's Advisory Committee on Academic Computing<br>Ad Hoc Computer Science Center Advisory Committee (Chairman)<br>Committee on Honors and Prizes<br>Institute for Physical Sciences & Technology Advisory Committee<br>Field Committee on Mechanics for Applied Mathematics Program |
| 1983-84        | Chancellor's Advisory Committee on Academic Computing<br>President's Advisory Committee on Academic Computing<br>Ad Hoc Computer Science Center Advisory Committee (Chairman)<br>Committee on Honors and Prizes<br>Field Committee on Mechanics for Applied Mathematics Program  |
| 1984 Fall      | On leave   |
| 1985<br>Spring | Chancellor's Advisory Committee on Academic Computing<br>Committee on Honors and Prizes<br>Field Committee on Mechanics for Applied Mathematics Program<br>Search Committee for Mathematics Department Chairman  |
| 1985 Fall      | On leave   |
| 1986<br>Spring | Committee on Honors and Prizes<br>Graduate Committee of Applied Mathematics Program<br>Chairman, Search Committee for Director of UMIACS   |
| 1986-87        | On leave   |
| 1987-88        | Committee on Permanent Appointments to UMIACS.   |
| 1988-89        | College Park Campus Academic Planning and Advisory Committee<br>Committee on Permanent Appointments to UMIACS  |

Alex J. Dragt

Service Activities (continued)

A. University (continued)

1989-90	College Park Campus Academic Planning and Advisory Committee Committee on Permanent Appointments to UMIACS Search Committee for CMPS Dean College Park Campus Senate
1990-91	College Park Campus Academic Planning and Advisory Committee Committee on Permanent Appointments to UMIACS College Park Campus Senate College Park Campus Middle States Review Committee College Park Campus Committee for the Elimination of the College of Human Ecology Chair, College Park Campus Subcommittee for the Reallocation of the Department of Textiles and Consumer Economics
1991-92	Chancellor's Advisory Committee on University Reorganization President's Advisory Committee on University Reorganization Committee on Permanent Appointments to UMIACS College Park Campus Senate College Park Campus Middle States Review Committee College Park Campus Committee for the Elimination of the College of Human Ecology Chair, College Park Campus Subcommittee for the Reallocation of the Department of Textiles and Consumer Economics
1992-93	Committee on Permanent Appointments in UMIACS
1993-94	Chair, Vice Presidents' Information Technology Advisory Committee (VITAC)
1994-95	On leave
1995-96	Chair, Middle States Review Task Force on Promoting Excellence in Research and Enhancing Its Role in Education and Service
1996-97	Chair, Middle States Review Task Force on Promoting Excellence in Research and Enhancing Its Role in Education and Service
1997-98	None
1998-99	CMPS College APT Committee
1999-00	CMPS College APT Committee (Chair) CMPS College Committee on Computational Science
2000-01	CMPS College APT Committee (Chair)

CMPS College Committee on Computational Science

2001-02 On leave

2002-03 None

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Alex J. Dragt

Service Activities (continued)

A. University (continued)

2003-04 CSCAMM Faculty Search Committee

2004-05 CSCAMM Faculty Search Committee

Alex J. Dragt

Service Activities (continued)

B. Department

- |         |   |
|---------|---|
| 1965-66 | Publications Committee  |
| 1966-67 | Publications Committee (Chairman)   |
| 1967-68 | Graduate Committee in Physics<br>Graduate Entrance Committee  |
| 1968-69 | Graduate Entrance Committee (Chairman)<br>Graduate Committee in Physics<br>Special Committee on Meaningful Integration  |
| 1969-70 | Graduate Entrance Committee<br>Elementary Course Committee<br>Special Committee on Meaningful Integration<br>Lecture Facilities Subcommittee  |
| 1970-71 | Special Committee on Meaningful Integration (Chairman)<br>Administrator of Falk Program for Recruiting and Advising Black and other<br>Minority Students<br>Graduate Laboratory Exemption Committee |
| 1971-72 | Special Committee on Meaningful Integration (Chairman)<br>Graduate Laboratory Exemption Committee<br>Program Administrator for Recruiting and Advising Black and other Minority<br>Students         |
| 1972-73 | On leave  |
| 1973-74 | Teaching Excellence Committee<br>Dept. Committee on Use of Computers (Chairman)<br>Graduate Committee for Applied Mathematics Program representing Physics<br>and Astronomy                         |
| 1974-75 | Graduate Committee for Applied Mathematics Program representing Physics<br>and Astronomy<br>Dept. Committee on the Use of Computers (Chairman)<br>Physics Council (Chairman)                        |
| 1975-76 | Graduate Committee for Applied Mathematics Program representing Physics<br>and Astronomy  |
| 1976-77 | Graduate Committee for Applied Mathematics Program representing Physics<br>and Astronomy  |



1977-78	Graduate Committee for Applied Mathematics Program representing Physics and Astronomy
1978-79	On leave
1979-80	Faculty Salary Advisory Committee

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Alex J. Dragt

Service Activities (continued)

B. Department (continued)

1980-81	Faculty Salary Advisory Committee (Co-Chairman) Graduate Entrance Committee
1981-82	Graduate Entrance Committee (Chairman) Graduate Education Committee
1982-83	Graduate Entrance Committee Teaching Excellence Committee (Chairman) General Committee on Undergraduate Education
1983-84	Center for Theoretical Physics Mini Special Year in Nonlinear Dynamics Committee Local Organizing Committee for 13'th International Colloquium on Group Theoretical Methods in Physics (Co-Chairman) Chairman's Blue Ribbon Committee
1984 Fall	On leave
1985 Spring	PLUM Advisory Board
1985 Fall	On leave
1986 Spring	PLUM Advisory Board Bohr Anniversary Committee MUPPET Project
1986-87	On leave
1987-88	General Committee on Graduate Education Qualifying Examination Committee (Chairman) Physics 121-122 Lecture Course Group Leader Center for Theoretical Physics Committee PLUM Advisory Board (Chairman)
1988-89	Department Academic Planning and Research Committee (Chairman) Department Computer Committee Physics 121-122 Lecture Course Group Leader

1989-90     Department Academic Planning and Research Committee (Chairman)  
              Department Computer Committee  
              Liaison Officer for Applied Mathematics

1990-91     Department Academic Planning and Research Committee (Chairman)  
              Department Computer Committee  
              Liaison Officer for Applied Mathematics

Alex J. Dragt

Service Activities (continued)

B. Department (continued)

1991-92	Department Academic Planning and Research Committee (Chairman) Department Computer Committee Liaison Officer for Applied Mathematics
1992-93	Department Priorities Committee (Chairman) Chairman of Faculty Assembly Department Computer Committee Liaison Officer for Applied Mathematics
1993-94	Department Priorities Committee (Chairman) Department Computer Committee Department Educational Review Committee Liaison Officer for Applied Mathematics
1994-95	On leave
1995-96	Department Computer Committee
1996-97	Department Computer Committee
1997-98	Department Computer Committee (Chairman)
1998-99	Department Computer Committee (Chairman) Department Priorities Committee
1999-00	Department Priorities Committee Department Computer Committee
2000-01	Department Priorities Committee Search Committee for Department Director of Business and Finance Search Committee for AMO Faculty Chair of Committee for R. Ferrell Award
2001-02	On leave
2002-03	Co-Chair of Department Colloquium Committee Committee for R. Ferrell Award
2003-04	Co-Chair of Department Colloquium Committee

Alex J. Dragt

## Courses Taught at the University of Maryland

Fall (4)	1965	Physics 127	Elements of Mathematical Physics	
Spring	1966	Physics 128	Elements of Theoretical Physics	(4)
Fall (4)	1966	Physics 127	Elements of Mathematical Physics	
Spring	1967	Physics 128	Elements of Theoretical Physics	(4)
Fall (4)	1967	Physics 127	Elements of Mathematical Physics	
Spring	1968	Physics 128	Elements of Theoretical Physics	(4)
Fall	1968	Physics 257	Theoretical Methods in Elem. Particles	(3)
Spring	1969	Physics 128H	Elements of Theoretical Physics	(4)
Fall	1969	Physics 257	Theoretical Methods in Elem. Particles	(3)
Spring	1970	Physics 10	Fundamentals of Physics	(4)
Fall	1970	Physics 257	Theoretical Methods in Elem. Particles	(3)
Spring	1971	Physics 209	Graduate Laboratory	(3)
Fall	1971	Physics 601 Physics 798 Physics 499H Math. 498	Theoretical Dynamics Spec. Probs. in Advanced Physics (3 students) Honors Reading Course (1 student) Special Problems (1 student)	(3)
Spring	1972	Physics 601 Physics 798 Physics 499A	Theoretical Dynamics Spec. Probs. in Advanced Physics (2 students) Reading Course (1 student)	(3)
1972-73		On leave		
Fall	1973	Physics 601 Physics 798	Theoretical Dynamics Spec. Probs. in Advanced Physics (3 students)	(3)
Spring	1974	Physics 601 Physics 798	Theoretical Dynamics Spec. Probs. in Advanced Physics (2 students)	(3)
Fall	1974	Physics 121 Physics 899	Fundamentals of Physics Doctoral Research (1 student)	(4)
Spring	1975	Physics 122 Physics 798 Physics 798 Physics 899	Fundamentals of Physics Special Problems (2 students) Special Problems (1 student) Doctoral Research (1 student)	(4)
Fall	1975	Physics 899	Doctoral Research (1 student)	
Spring	1976	Physics 899	Doctoral Research (1 student)	

Fall 1976	Physics 899	Doctoral Research (1 student)	
Spring 1977	MAPL 799	Master's Thesis Research (1 student)	
	Astr 625/Phys 889A	Galactic Dynamics, etc.	(3)

Alex J. Dragt

## Courses Taught at the University of Maryland (continued)

Fall (4)	1977	PHYS 889A/MAPL 698C	Ordinary Differential Equations and Classical Mechanics I	
Spring (4)	1978	PHYS 889A/MAPL 698C	Ordinary Differential Equations and Classical Mechanics II	
	1978-79	On leave		
Fall 3)	1979	Physics 818	Contemporary & Advanced Classical Mechanics	(
Spring	1980	Physics 117	Design of laboratory for new course	
Fall	1980	Physics 117	Physics for the General College Student	(4)
Spring	1981	Physics 601	Theoretical Dynamics	(3)
		Physics 299	Special Problems in Physics (1 student)	(3)
Fall	1981	Physics 117	Physics for the General College Student	(4)
		Physics 899	Doctoral Research (1 student)	(3)
Spring	1982	Physics 601	Theoretical Dynamics	(3)
		Physics 809	Classical Field Theory	(1)
		Physics 899	Doctoral Research (1 student)	(6)
Fall	1982	Physics 117	Physics for the General College Student	(4)
		Physics 499	Special Topics in Dynamical Systems (1 student)	(3)
		Physics 899	Doctoral Research (1 student)	(6)
Spring	1983	Physics 818	Contemporary and Advanced Classical Mechanics	(3)
		Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
		Physics 899	Doctoral Research (1 student)	(6)
Fall	1983	Physics 819	Advanced Mathematical Physics	(3)
		Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
		Physics 899	Doctoral Research (2 students)	(5)
Spring	1984	Physics 623	Quantum Mechanics II	(3)
		Physics 719	Seminar on Accelerator Theory and Dynamical Systems	
(1)		Physics 899	Doctoral Research (2 students)	(5)
Fall	1984	On leave		
		Physics 899	Doctoral Research (2 students)	(14)
Spring	1985	Honors 120A	Simulation of Nature Using a Personal Computer	
(3)				

(1)	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	
(3)	Physics 798	Special Study in Field Theory (1 student)	
	Physics 899	Doctoral Research (2 students)	(14)

Alex J. Dragt

## Courses Taught at the University of Maryland (continued)

Fall	1985	On leave		
		Physics 899	Doctoral Research (2 students)	(15)
Spring	1986	Physics 117	Physics for the General College Student	(4)
		Physics 398A	Honors Course in Dynamical Systems	(1)
		Physics 719	Seminar on Accelerator Theory and Dynamical	
(1)			Systems	
		Physics 798	Special Study in Dynamical Systems	(3)
		Physics 899	Doctoral Research (2 students)	(15)
Fall	1986	On leave		
		Physics 899	Doctoral Research (1 student)	(9)
Spring	1987	On leave		
		Physics 899	Doctoral Research (2 students)	(15)
Fall	1987	Physics 121	Fundamentals of Physics	(4)
		Physics 899	Doctoral Research (2 students)	(9)
		Physics 719	Seminar on Accelerator Theory and Dynamical	
			Systems	(1)
Spring	1988	Physics 122	Fundamentals of Physics	(4)
		Physics 299	Independent Study	(2)
		Physics 899	Doctoral Research (1 student)	(3)
		Physics 719	Seminar on Accelerator Theory and Dynamical	
(1)			Systems	
Fall	1988	Physics 121	Fundamentals of Physics	(4)
		Physics 899	Doctoral Research (1 student)	(9)
		Physics 719	Seminar on Accelerator Theory and Dynamical	
(1)			Systems	
Spring	1989	Physics 122	Fundamentals of Physics	(4)
		Physics 899	Doctoral Research (1 student)	(9)
		Physics 719	Seminar on Accelerator Theory and Dynamical	(1)
			Systems	
Fall	1989	Physics 121	Laboratory Physics	-
		Physics 122		-
		Physics 899	Doctoral Research (1 Student)	(6)
		Physics 719	Seminar on Accelerator Theory and Dynamical	(1)
			Systems	
Spring	1990	Physics 121	Laboratory Physics	-
		Physics 122		-
		Physics 899	Doctoral Research (1 Student)	(6)
		Physics 719	Seminar on Accelerator Theory and Dynamical	(1)
			Systems	





Alex J. Dragt

## Courses Taught at the University of Maryland (continued)

Fall 1990	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Spring 1991	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Fall 1991	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Spring 1992	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Fall 1992	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Spring 1993	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Fall 1993	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)
Spring 1994	Physics 121	Laboratory Physics	-	-
	Physics 122			-
	Physics 899	Doctoral Research (1 Student)		(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems		(1)

Alex J. Dragt

## Courses Taught at the University of Maryland (continued)

Fall 1994	On leave		
	Physics 899	Doctoral Research (2 Students)	(6)
Spring 1995	On leave		
	Physics 899	Doctoral Research (2 Students)	(6)
Fall 1995	GRB Grant		
	Physics 899	Doctoral Research (2 Students)	(6)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 1996	Physics 122	Fundamentals of Physics	(4)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Fall 1996	On leave		
Spring 1997	Physics 122	Fundamentals of Physics	(4)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Fall 1997 (4)	Physics 121	Fundamentals of Physics	
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 1998	----	Undergraduate Honors Thesis Advisor	----
	Physics 122	Fundamentals of Physics	(4)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Fall 1998	Physics 122	Fundamentals of Physics	(4)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 1999	Physics 115	Inquiry into Physics	(4)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
	Physics 798G	Seminar on Quantum Computing	(1)
Fall 1999 (4)	Physics 115	Inquiry into Physics	
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 2000	Physics 798G	Seminar on Quantum Computing	(1)
	Physics 115	Inquiry into Physics	(4)

Phys 499B	Undergraduate Independent Study	(2)
Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Physics 798G	Seminar on Quantum Computing	(1)

Alex J. Dragt

## Courses Taught at the University of Maryland (continued)

Fall 2000	Physics 115	Inquiry into Physics	(4)
	Phys 499B	Undergraduate Independent Study	(2)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 2001	Physics 798G	Seminar on Quantum Computing	(1)
	Physics 115	Inquiry into Physics	(4)
	Phys 499B	Undergraduate Independent Study	(2)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Summer 2001	Physics 798G	Seminar on Quantum Computing	(1)
	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)
Fall 2001	On leave		
	Physics 899	Doctoral Research (1 Student)	(3)
Spring 2002	On leave		
	Physics 899	Doctoral Research (1 Student)	(3)
Summer 2002	On leave		
	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)
Fall 2002	Physics 601	Theoretical Dynamics	(3)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Spring 2003	Physics 121	Fundamentals of Physics	(4)
	Physics 899	Doctoral Research (1 Student)	(3)
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
Summer 2003	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)
Fall 2003	Bought out from teaching		
	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)
Spring 2004	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)

Summer 2004	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)

Alex J. Dragt

Courses Taught at the University of Maryland (continued)

Fall 2004	Physics 719	Seminar on Accelerator Theory and Dynamical Systems	(1)
	Physics 899	Doctoral Research (1 Student)	(2)
	Physics 899	Doctoral Research (1 Student)	(2)

Professor Rafael Fernandes of the School of Physics and Astronomy has received the 2021 George W. Taylor Award for Distinguished Research from the College of Science and Engineering. Skillman named CSE Distinguished Professor. Professor Evan Skillman of the School has been named a College of Science and Engineering Distinguished Professor. X. Physics and technique. Of accelerators. PHYSICS OF PARTICLES AND NUCLEI LETTERS Vol. 13 No. 7 2016. Methods of geometrical integration in accelerator physics 781. k-th order of nonlinearities.Â malism by A. Dragt conserve the qualitative properties. inherent to the considered dynamical system. It is well.Â dsat/dsatmarylie.html. 5. R. Bellman, Introduction to Matrix Analysis (McGrawÂ College Park). www.physics.umd.edu/dsat/. 11. W.-H. Steeb and T. K. Shi, Matrix Calculus and Kro- necker Product with Applications and C++ Programs. MIT Physics courses available online and for free.Â MIT OpenCourseWare is a free & open publication of material from thousands of MIT courses, covering the entire MIT curriculum. No enrollment or registration. Freely browse and use OCW materials at your own pace.