Curriculum Vitae (11/07)   dragt@physics.umd.edu
Alex J. Dragt   www.physics.umd.edu/dsat/
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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 & Senior Research Scientist, 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

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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Curriculum Vitae (continued)

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
Institute of Electrical and Electronics Engineers

VI. Honors and Awards

NSF Predoctoral Fellow, l959-62
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
Fellow, American Association for the Advancement of Science

VII. Theses Directed

See attached list.

VIII. Grants, Contracts, and Awards

See attached list.

 IX. Professional Service

See attached list.

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Bibliography

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, Plant. 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).

Alex J. Dragt

Bibliography (continued)

18. LIE SERIES AND INVARIANT FUNCTIONS FOR ANALYTIC SYMPLECTIC MAPS, with J. Finn, J. Math. Phys. 17: 2215-2227 (1976).

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).

29. COMPUTATION OF NONLINEAR BEHAVIOR OF HAMILTONIAN SYSTEMS USING LIE ALGEBRAIC METHODS, with E. Forest, J. Math. Physics 24, p. 2734 (1983).

30. MARYLIE, THE MARYLAND LIE ALGEBRAIC BEAM TRANSPORT AND PARTICLE TRACKING PROGRAM, with D. Douglas, IEEE Trans. Nuc. Sci., NS-30, p. 2442 (1983).

31. LIE ALGEBRAIC METHODS FOR PARTICLE TRACKING CALCULATIONS, with D. Douglas, Proceedings of the 12th International Conference on High-Energy Accelerators, F.T. Cole and R. Donaldson, Edit., Fermilab (1983).

32. PARTICLE TRACKING USING LIE ALGEBRAIC METHODS, with D. Douglas, Computing in Accelerator Design and Operation, W. Busse and R. Zelazny, Edit., Lecture Notes in Physics 215, Springer-Verlag (1984).

Alex J. Dragt

Bibliography (continued)

33. NONLINEAR LATTICE FUNCTIONS, Proceedings of 1984 Summer Study on the Design and Utilization of the Superconducting Super Collider, Snowmass, Colorado, R. Donaldson and J. Morfin, edit., published by the Division of Particles and Fields of the American Physical Society (1985).

34. COMPUTING REQUIREMENTS FOR S.S.C. ACCELERATOR DESIGN STUDIES, with R. Talman et al., Proceedings of 1984 Summer Study on the Design and Utilization of the Superconducting Super Collider, Snowmass, Colorado, R. Donaldson and J. Morfin, edit., published by the Division of Particles and Fields of the American Physical Society (1985).

35. AN EXPERIMENTAL PROPOSAL TO USE THE TEVATRON AS AN AID TO SSC DESIGN BY TESTING OUR UNDERSTANDING OF EFFECTS CONTROLLING DYNAMIC APERTURE, with T. Collins et al., Proceedings of 1984 Summer Study on the Design and Utilization of the Superconducting Super Collider, Snowmass, Colorado, R. Donaldson and J. Morfin, edit., published by the Division of Particles and Fields of the American Physical Society (1985).

36. MARYLIE 3.0 - A PROGRAM FOR NONLINEAR ANALYSIS OF ACCELERATOR AND BEAMLINE LATTICES, with L. Healy et al., IEEE Transactions on Nuclear Science, NS-32, p. 2311 (1985).

37. FOUNDATIONS OF A LIE ALGEBRAIC THEORY OF GEOMETRICAL OPTICS, with E. Forest and K. Wolf, published in Lie Methods in Optics, J.S. Mondragon and K.B. Wolf, editors, Springer-Verlag (1986).

38. LIE ALGEBRAIC THEORY OF CHARGED PARTICLE OPTICS AND ELECTRON MICROSCOPES, with E. Forest, Advances in Electronics and Electron Physics, vol. 67, P. Hawkes, edit., Academic Press (1986).

39. ELEMENTARY AND ADVANCED LIE ALGEBRAIC METHODS WITH APPLICATIONS TO ACCELERATOR DESIGN, ELECTRON MICROSCOPES, AND LIGHT OPTICS, Nuclear Instruments and Methods in Physics Research A258, 339 (1987).

40. INFLUENCE OF STRONGLY CURVED LARGE-BORE SUPERCONDUCTING BENDING MAGNETS ON THE OPTICS OF STORAGE RINGS, with H. Moser, Nucl. Instrum. Meth. Phys. Res. B24/25, p. 877 (1987).

41. SCALING LAWS FOR ABERRATIONS IN MAGNETIC QUADRUPOLE LENS SYSTEMS, with R. Moses et al., Proceedings of the 1987 IEEE Particle Accelerator Conference, Vol. 3, p. 1764 (1987).

42. LIE ALGEBRAIC TREATMENT OF SPACE CHARGE, with R. Ryne, Proceedings of the 1987 IEEE Particle Accelerator Conference, Vol. 2, p. 1063 (1987).

43. NUMERICAL COMPUTATION OF TRANSFER MAPS USING LIE ALGEBRAIC METHODS, with R. Ryne, Proceedings of the 1987 IEEE Particle Accelerator Conference, Vol. 2, p. 1081 (1987).

44. LIE ALGEBRAIC METHODS FOR TREATING LATTICE PARAMETER ERRORS IN ACCELERATORS, with L. Healy, Proceedings of the 1987 IEEE Particle Accelerator Conference, Vol. 2, p. 1060 (1987).

Alex J. Dragt

Bibliography (continued)

45. ACCELERATOR PHYSICS AND TECHNOLOGY OVERVIEW, Proceedings of the 1986 Snowmass summer study on the Physics of the Superconducting Supercollider (1987).

46. NONLINEAR BEAM OPTICS WITH REAL FIELDS IN COMPACT STORAGE RINGS, with H. Moser, Nucl. Instrum. Meth. Phys. Res. B30, p. 105 (1988).

47. ETERNITY, CHAOS, LIE ALGEBRAS, INTEGRABILITY, AND ACCELERATOR DESIGN, Proceedings of the Third Florida Workshop in Nonlinear Astronomy (Integrability in Dynamical Systems), New York Academy of Sciences (1988).

48. LIE ALGEBRAIC METHODS FOR CHARGED PARTICLE OPTICS, AIP Conference Proceedings 177, C. Eminhizer, edit. (1988).

49. LIE ALGEBRAIC TREATMENT OF LINEAR AND NONLINEAR BEAM DYNAMICS, with F. Neri et al., Annual Review of Nuclear and Particle Science 38, p. 455 (1988).

50. ANALYSIS OF TRACKING DATA USING NORMAL FORMS, with F. Neri, proceedings of the Rome Accelerator Conference (1988).

51. CONCATENATION OF LIE ALGEBRAIC MAPS, with L. Healy, Lecture Notes in Physics 352: Lie Methods in Optics II, Springer Verlag (1989).

52. THEORY OF EMITTANCE INVARIANTS, with R. Gluckstern et al., Lecture Notes in Physics 343: Proceedings of the Joint US-CERN Capri School on Accelerator Physics, Springer Verlag (1989).

53. GENERALIZED EMITTANCE INVARIANTS, with G. Rangarajan et al., Proceedings of the IEEE Accelerator Conference, p. 1280 (1989).

54. SOLVABLE MAP REPRESENTATION OF A NONLINEAR SYMPLECTIC MAP, with G. Rangarajan et al., Particle Accelerators 28, p. 119 (1990).

55. RELEASE OF MARYLIE 3.0, with F. Neri et al., Proceedings of the IEEE Accelerator Conference, p. 1283 (1989).

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

57. MAGNETIC OPTICS CALCULATIONS FOR CYLINDRICALLY SYMMETRIC BEAMS WITH SPACE CHARGE, with R. Ryne, Particle Accelerators 35, p. 129 (1991).

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).

Alex J. Dragt

Bibliography (continued)

61. KICK FACTORIZATION OF SYMPLECTIC MAPS, with I.M. Gjaja and G. Rangarajan, Proceedings of the IEEE Accelerator Conference, p. 1621 (1991).

62. INVARIANT METRICS FOR HAMILTONIAN SYSTEMS, with G. Rangarajan and F. Neri, Proceedings of the IEEE Accelerator Conference, p. 1630 (1991).

63. JOLT FACTORIZATION OF SYMPLECTIC MAPS, with D.T. Abell, Int. J. Mod. Phys. A (Proc. Suppl.) 2B, p. 1019 (World Scientific, 1993).

64. A COMPARISON OF METHODS FOR LONG-TERM TRACKING USING SYMPLECTIC MAPS, with I. Gjaja and D.T. Abell, Proceedings of the Berlin Workshop on Nonlinear Problems in Accelerator Physics , Institute of Physics Conference Series Number 131, M. Berz, S. Martin, and K. Ziegler, Edit. (Institute of Physics, Bristol and Philadelphia, 1993).

65. TAYLOR SERIES MAPS AND THEIR DOMAIN OF CONVERGENCE, with D.T. Abell, Stability of Particle Motion in Storage Rings, AIP Conference Proceedings No. 292, M. Month, A. Ruggiero, and W. Weng, Edit. (American Institute of Physics, 1994).

66. THE MODERN APPROACH TO SINGLE PARTICLE DYNAMICS FOR CIRCULAR RINGS, with E. Forest et al., Stability of Particle Motion in Storage Rings, AIP Conference Proceedings No. 292, M. Month, A. Ruggiero, and W. Weng, Edit. (American Institute of Physics, 1994).

67. SYMPLECTIC MAPS AND COMPUTATION OF ORBITS IN PARTICLE ACCELERATORS, with D.T. Abell, Integration Algorithms and Classical Mechanics, eds. J.E. Marsden, G.W. Patrick, and W.F. Shadwick, Fields Institute Communications, Vol. 10, American Mathematical Society (Providence, RI, 1996).

68. OVERVIEW OF LIE ALGEBRAIC METHODS FOR ACCELERATOR PHYSICS, Proceedings of the 14th Conference on Charged Particle Accelerators, Protvino, Moscow Region, Russia (1995).

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).

71. DESIGN FEATURES OF A SMALL ELECTRON RING FOR STUDY OF RECIRCULATING SPACE-CHARGE DOMINATED BEAMS, with M. Reiser et al., Fusion Engineering and Design, 32-33, (1996).

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).

Alex J. Dragt

Bibliography (continued)

74. MATCHING SECTION AND INJECTOR DESIGN FOR A MODEL ELECTRON RING, with S. Bernal et al., Fusion Eng. Des. 32-33, 277 (1996).

75. A MULTI-PLATFORM GRAPHIC USER INTERFACE FOR THE PARTICLE OPTICS CODE MARYLIE, with G. Gillespie et al., Proceedings of the XIXth International Linear Accelerator Conference (1998).

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).

84. ACCURATE COMPUTATION OF TRANSFER MAPS FROM MAGNETIC FIELD DATA, with M. Venturini, Nuclear Instruments and Methods, A427, p. 387 (1999).

85. BEYOND MOORE'S LAW: QUANTUM COMPUTING WITH RF SQUIDS, with J. Anderson, C. Lobb, F.C. Wellstood, M. Gubrud, and M. Ejrnaes, *Cluster and Nanostructure Interfaces*, edited by P. Jena, S.N. Khanna, and B.K. Rao, World Scientific Pub. (2000).

86. SUB-GAP LEAKAGE IN NB/ALO$_x$/NB AND AL/ALO$_x$/AL JOSEPHSON JUNCTIONS, with M.A. Gubrud, M. Ejrnaes, A.J. Berkley, R.C. Ramos, Jr., I. Jin, J.R. Anderson, C.J. Lobb, and F.C. Wellstood. To appear in *IEEE Transactions on Applied Superconductivity*.

87. COMPUTATION OF CHARGED-PARTICLE TRANSFER MAPS FOR GENERAL FIELDS AND GEOMETRIES USING ELECTROMAGNETIC BOUNDARY-VALUE DATA, with P. Walstrom et al., Proceedings at the 2001 International Particle Accelerator Conference (2001).

Alex J. Dragt

Bibliography (continued)

88. THE PROPAGATION OF QUANTUM RELATIVISTIC WAVEPACKETS IN ELECTROMAGNETIC FIELDS, with P. Johnson, Proceedings of the 2001 International Particle Accelerator Conference (2001).

89. THE MOYAL-LIE THEORY OF PHASE SPACE QUANTUM MECHANICS, with T. Hakioglu, J. Phys. A. 34 (2001).

90. CAPACITIVELY COUPLED JOSEPHSON JUNCTIONS: A TWO-QUBIT SYSTEM, with R.C. Ramos et al., IEEE Trans. Appl. Supercon. 13, 994-997 (2003).

91. JOSEPHSON-JUNCTION QUBITS: ENTANGLEMENT AND COHERENCE, with J.R. Anderson, A.J. Berkley, M.A. Gubrud, P.R. Johnson, C.J. Lobb, R.C. Ramos, F.W. Strauch, F.C. Wellstood, H. Xu, Superlattices and Microstructures, Vol. 32, Nos. 4-6, 2002, Elsevier Ltd. (2003).

92. SPECTROSCOPY OF CAPACITIVELY COUPLED JOSEPHSON-JUNCTION QUBITS, with P. Johnson et al., Physical Review B 67, Rapid Communications (2003).

93. ENTANGLED MACROSCOPIC QUANTUM STATES IN TWO SUPERCONDUCTING QUBITS, with A.J. Berkeley, H. Xu, R.C. Ramos, M.A. Gubrud, F.W. Strauch, P.R. Johnson, J.R. Anderson, C.J. Lobb, and F.C. Wellstood, Science 300, p. 1548 (2003).

94. RESPONSE TO DEFINING ENTANGLEMENT BY ANTONI WOJCIK, with A.J. Berkley, H. Xu, R.C. Ramos, M.A. Gubrud, F.W. Strauch, P.R. Johnson, J.R. Anderson, C.J. Lobb, and F. Wellstood, Science 301, p. 1183 (2003).

95. WIGGLERS AND SINGLE-PARTICLE DYNAMICS IN THE NLC DAMPING RINGS, with M. Venturini and A. Wolski, Proceedings of the 2003 International Particle Accelerator Conference (2003).

96. MARYLIE/IMPACT: A PARALLEL 5TH ORDER BEAM OPTICS CODE WITH SPACE CHARGE, with R. Ryne, A. Adelmann, 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).

97. QUANTUM LOGIC GATES FOR COUPLED SUPERCONDUCTING PHASE QUBITS, with F.W. Strauch, P.R. Johnson, C.J. Lobb, J.R. Anderson, and F.C. Wellstood, Phys. Rev. Lett. **91**, 167005-1 to 167005-4 (2003).

98. SPECTROSCOPY OF MULTIPARTICLE ENTANGLEMENT IN A MACROSCOPIC SUPERCONDUCTING CIRCUIT, with H. Xu, F.W. Strauch, S.K. Dutta, P.R. Johnson, R.C. Ramos, A.J. Berkley, H. Paik, J.R. Anderson, C.J. Lobb, and F.C. Wellstood, Phys. Rev. Lett. **94,** 027003 (2005).

99. SPECTROSCOPIC RESONANCE BROADENING IN A JOSEPHSON JUNCTION QUBIT DUE TO CURRENT NOISE, with H. Xu, A.J. Berkley, R.C. Ramos, M.A. Gubrud, P.R. Johnson, F.W. Strauch, J.R. Anderson, C.J. Lobb, and F.C. Wellstood, Phys. Rev. B **71**, 064512 (2005).

100. MACROSCOPIC TUNNEL SPLITTINGS IN SUPERCONDUCTING PHASE QUBITS, with P.R. Johnson, W.T. Parson, F.W. Strauch, J.R. Anderson, C.J. Lobb, and F.C. Wellstood, accepted for publication in Phys. Rev. Lett. (2005).

Alex J. Dragt

Bibliography (continued)

101. THE SYMPLECTIC GROUP AND CLASSICAL MECHANICS, Annals of the New York Academy of Sciences, Vol. 1045 (2005).

102. COOPER-PAIR BOX AS A VARIABLE CAPACITOR, with H. Paik, F.W. Strauch, R.C. Ramos, A.J. Berkley, H. Xu, S.K. Dutta, P.R. Johnson, J.R. Anderson, C.J. Lobb, and F.C. Wellstood (2005).

103. COMPUTATION OF TRANSFER MAPS FROM MAGNETIC FIELD DATA IN LARGE ASPECT-RATIO APERTURES, with C.E. Mitchell, Proceedings of the 9th International Computational Accelerator Physics Conference, Chamonix Mont-Blanc, France (2006).

104. RECENT PROGRESS ON THE MARYLIE/IMPACT BEAM DYNAMICS CODE, with R.D. Ryne et al., Proceedings of the 9th International Computational Accelerator Physics Conference, Chamonix Mont-Blanc, France (2006).

105. COMPUTATION OF TRANSFER MAPS FROM MAGNETIC FIELD DATA IN WIGGLERS AND UNDULATORS, with C.E. Mitchell, International Committee for Future Accelerators Beam Dynamics Newsletter No. 42 (2007).

106. SYMPLECTIC RECIPROCITY OF TRANSFER MAPS FOR STATIC BEAMLINE ELEMENTS, to be submitted to Phys. Rev. STAB (2007).

107. REVERSAL PROPERTIES OF HAMILTONIANS AND THEIR TRANSFER MAPS, to be submitted to Phys. Rev. STAB (2007).

108. PLETHORA OF GENERATING FUNCTIONS, in preparation (2007).

109. NORMAL FORM AND TRANSFER MAPS FOR THE MORSE OSCILLATOR, with F. Strauch, paper in preparation.

110. COMPARISON OF COHERENCE TIMES IN THREE DC SQUID PHASE QUBITS, with H. Paik et al., to appear in IEEE Trans. Appl. Superconductivity (2007).

111. STRONG-FIELD EFFECTS IN RABI OSCILLATIONS OF THE SUPERCONDUCTING PHASE QUBIT, with F. Strauch et al., to appear in IEEE Trans. Appl. Superconductivity (2007).

112. FAST HIGH-FIDELITY MEASUREMENTS OF THE GROUND AND EXCITED STATES OF A DC-SQUID PHASE QUBIT, with T. Palomaki et al. (2007).

Alex J. Dragt

Bibliography (continued)

B. Books

1. LIE METHODS FOR NONLINEAR DYNAMICS WITH APPLICATIONS TO ACCELERATOR PHYSICS, some 1120 pages available in draft form (2007). See the web site www.physics.umd.edu/dsat/ and click on "Lie Methods & Accelerator Physics".

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). See the web site www.physics.umd.edu/dsat/ and click on "MaryLie Code & Manual".

3. Proceedings of the Sixth International Charged Particle Optics Conference (CPO-6), co-edited with Jon Orloff, Nuclear Instruments and Methods in Physics Research, 519, Issues 1 and 2 (2004)

C. Reports

1. NOTES ON THE POINCARE GROUP, U. OF MD. DEPT. OF PHYS. AND ASTR. TR #700 (36pp) (1970).

2. LECTURE NOTES ON THE POINCARE 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).

8. NUMERICAL METHODS IN CLASSICAL MECHANICS: A STROBOSCOPIC ANALYSIS OF DUFFING'S EQUATION, with S.W. Haan (36 pp) (1979).

9. LIE ALGEBRAIC DESCRIPTIONS OF CHARGED PARTICLE MOTION IN ACCELERATORS(5 pp) (1981).

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).

Alex J. Dragt

Bibliography (continued)

13. CLASSICAL INSTABILITY OF MINIMA IN SUPERSYMMETRIC FIELD THEORY POTENTIALS, with A.K. Das (11 pp) (1983).

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).

17. A COMPARISON OF MARYLIE 3.0 WITH NUMERICAL INTEGRATION, with J. Milutinovic (41 pp) (1985).

18. DYNAMIC APERTURE (3 pp) (1986).

19. A COMPARISON OF THIRD-ORDER GEOMETRIC ABERRATIONS AND SECOND- AND THIRD-ORDER CHROMATIC ABERRATIONS FOR QUADRUPOLE SYSTEMS AS COMPUTED BY MARYLIE, GIOS, AND TRANSPORT (20 pp) (1986).

20. USE OF MARYLIE TO COMPUTE SECOND AND THIRD ORDER ABERRATIONS, with R. Ryne (11 pp) (1986).

21. REVERSAL PROPERTIES

22. SYMPLECTIC MAPS AND SYMPLECTIC INTEGRATION (6 pp) (1988).

23. REPORT TO THE LA JOLLA CONFERENCE ON MODELING AND CODE DEVELOPMENT (3 pp) (1988).

24. NUMERICAL THIRD-ORDER TRANSFER MAP FOR COMBINED-FUNCTION DIPOLE, with F. Neri et al., (25 pp) (1989).

25. ANALYTIC THIRD-ORDER TRANSER MAP FOR COMBINED-FUNCTION QUADRUPOLE, with J. van Zeijts et al., (33 pp) (1989).

26. LIE ALGEBRAIC THEORY OF TELESCOPE ABERRATIONS, with F. Neri (1989).

27. OPTIMZATION 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).

32. LIE METHODS FOR RAY AND WAVE OPTICS, (110 pp.) (1995).

Alex J. Dragt

Bibliography (continued)

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).

34. DESIGN OF OPTIMAL TRUNCATED POWER SERIES ALGEBRA ROUTINES: II. COMPUTING SUMS AND ORDINARY AND LIE PRODUCTS OF POLYNOMIALS USING MONOMIAL INDEXING OR LINKED LISTS, with M. Venturini, (39 pp) (1996).

35. REPRESENTATION AND ITERATION OF MAPS, (14 pp) (1996).

36. AN ESTIMATE OF THE DOMAIN OF CONVERGENCE FOR THE LARGE HADRON COLLIDER'S ONE-TURN MAP, with D. Abell, (pp) (1997).

37. FOUNDATIONS OF A HYBRID PIC-LIE CHARGED PARTICLE BEAM TRANSPORT COE, PART I: FORMULAS FOR TWO SPATIAL DIMENSIONS, with R. Ryne, (15 pp) 1998).

38. RELATION BETWEEN EXPANSIONS IN ENERGY AND MOMENTUM DEVIATION VARIABLES, with M. Venturini, (16 pp) (1998).

39. NOTES ON THE EUCLLIDEAN 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).

46. LIE ALGEBRAIC TREATMENT OF LINEAR AND NONLINEAR BEAM DYNAMICS, (41 pp).

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, l977.

ADIABATIC INVARIANTS AND STOCHASTICITY IN THE VAN ALLEN RADIATION, N.C. Christophilos International Summer School and Conference in Plasma Physics, Spetses, Greece, l977.

TRANSFER MAP APPROACH TO THE BEAM-BEAM INTERACTION, Conference on the Beam-Beam Interaction, Brookhaven National Laboratory, New York l979.

LIE ALGEBRAS AND DYNAMICAL SYSTEMS, invited talk given at annual summer meeting of Canadian Mathematical Society, Saskatoon, Canada, May l979.

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.

Alex J. Dragt

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.

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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.

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Bibliography (continued)

1. Invited Papers (continued)

THE SYMPLECTIC GROUP AND CLASSICAL MECHANICS, presented at the Kandrup Memorial Workshop, Department of Astronomy, University of Florida, Gainesville, November 2004.

MAP METHODS FOR ACCELERATORS, plenary talk presented at International Conference on Geometrical Integration, Castellon, Spain (2006).

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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.

POINCARE 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.

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.

Alex J. Dragt

Bibliography (continued)

2. Colloquia (continued)

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.

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

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Bibliography (continued)

2. Colloquia (continued)

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.

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

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Bibliography (continued)

2. Colloquia (continued)

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.

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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.

COMPUTATION OF TRANSFER MAPS FROM ELLIPTIC CYLINDER BOUNDARY FIELD DATA, presented at Argonne National Laboratory, February 2005.

COMPUTATION OF TRANSFER MAPS FOR ILC DAMPING RING WIGGLERS BASED ON SURFACE DATA, Snowmass ILC Damping Ring Working Group, August 2005.

COMPUTATION OF TRANSFER MAPS FROM SURFACE DATA WITH APPLICATIONS TO WIGGLERS, presented at CERN, February 2006.

Same as above, presented at Fermi National Laboratory, February 2006.

Same as above, presented at Lawrence Berkeley National Laboratory, March 2006.

Same as above, Presented at Stanford Linear Accelerator Center, March 2006.

Same as above, Presented with C.E. Mitchell at Division of Physics of Beams Poster Session of the annual April American Physical Society meeting (2006).

Same as above, Presented at Jefferson Laboratory, April 2006.

Same as above, Presented at Cornell University, May 2006.

COMPUTATION OF TRANSFER MAPS FROM SURFACE DATA, presented at ILC Damping ring Workshop, Frascati, Italy (2007).

COMPUTATION OF TRANSFER MAPS FROM SURFACE DATA WITH APPLICATIONS TO ILC DAMPING RING WIGGLERS, International Particle Accelerator Conference Poster Session, Albuquerque, New Mexico, USA (2007).

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	M.S., June 2000	"Computation of Interior Vector Potential from Magnetic Field Boundary Values. "
William J. Farrell, III	M.S., June 2000	"Quantum Theory of the rf SQUID: A Quantum Qubit. "
Timothy Stasevich	M.S. June 2001	"Computing Transfer Maps from Magnetic Boundary Field Data."

B. Ph.D. Theses

Brian Beers	Ph.D., January 1970	"Some Aspects of Simple Production 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."

Alex J. Dragt

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."
Frederick Strauch	Ph.D., December 2004	"Theory of Superconducting Phase Qubits"
Chad Mitchell	Ph.D., December 2007	"Calculation of Realistic Charged-Particle Transfer Maps"

C. Current Students

Jonathan Sperling
    First-year graduate student: Graduate Research Assistant and Physics Department Fellow.
    Carrying out preliminary research in the area of Nonlinear Dynamics.

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 $l00,000.

Department of Energy contract DE-AS05-80ERl0666.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.

Department of Energy grant renewed in 2004 for $870,000 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

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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.

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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.

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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.

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Professional Service (continued)

2004-05	DOE/NSF High Energy Physics Advisory Panel (HEPAP). International Advisory Committee for 2005 International Computational Accelerator Physics Conference. Program Committee for 2005 International Particle Accelerator Conference.
2005-06	DOE/NSF High Energy Physics Advisory Panel (HEPAP). HEPAP Review Panel for Advanced Accelerator Research and Development.
2006-07	DOE/NSF High Energy Physics Advisory Panel (HEPAP). HEPAP Review Panel for Advanced Accelerator Research and Development.
2007-08	NSF Experimental Particle Physics (EPP) Program 2008 Panel.