

CURRICULUM VITAE

Derek A. Boyd
Professor of Physics

I. Education:

B.S.	University of Cape Town, South Africa	1964
B.S. (HONS)	University of Cape Town, South Africa	1965
M.S.	University of Cape Town, South Africa	1967
Ph.D.	Stevens Institute of Technology	1973

II. Experience in Higher Education:

1967-1973	Stevens Institute of Technology	Research Assistant, Teaching Assistant
1973-1974	University of Maryland	Research Associate
1974-1978	University of Maryland	Assistant Professor
1978-1983	University of Maryland	Associate Professor
1983-	University of Maryland	Professor
1988	Wolfson College, Oxford	Visiting Fellow
1989-1990	University of Maryland	Assoc. Chair Facilities&Personnel.
1990-1993	University of Maryland	Chair, Department of Physics

III. Experience Other than Higher Education:

1967	U.K.A.E.A. Culham Laboratory	Research Associate
1969	U.K.A.E.A. Culham Laboratory	Research Associate
1970	U.K.A.E.A. Culham Laboratory	Research Associate
1981	Jet Joint Undertaking (6 Months)	Visiting Scientist
1988	Jet Joint Undertaking	Visiting Scientist
1995	CCFM (Tdev) Montreal, Canada	Visiting Scientist

IV. Professional Activities:

American Physical Society
American Association of Physics Teachers
American Association for the Advancement of Science
University Fusion Association
Fusion Power Associates

V. Honors and Awards:

M.S. awarded with distinction
Fellow of the American Physical Society
Visiting Fellow, Wolfson College, Oxford 1988

VI. Publications:

1. The Field of the Tetrahedral Spire as a Magnetic Well, Nucl. Fusion **7**, 290-292 (1967), D. A. Boyd, W. A. Cilliers, and H. S. T. Driver.
2. High-Order Wave Mixing in Beam-Plasma Instabilities, Phys. Rev. Lett. **28**, 662-665 (1972), W. Carr, D. A. Boyd, H. Liu, G. Schmidt, and M. Seidl.

3. Production of Quiescent Plasmas in a Magnetic Field by Beam-Plasma Discharge, *Phys. Rev. Lett.* **28**, 723-726 (1972), D. Bollinger, D. A. Boyd, H. Liu, and M. Seidl.
4. Nonlinear Mode Competition in Beam-Plasma Instability, *Phys. Rev. Lett.* **30**, 84-86 (1973), W. Carr, D. Bollinger, D. A. Boyd, H. Liu, and M. Seidl.
5. Saturation of a Convective Instability Due to Trapped Particles, *Phys. Lett.* **43A**, 45-46 (1973), D. A. Boyd, D. Bollinger, W. Carr, H. Liu, and M. Seidl.
6. Measurement of the Evolution in Phase Space of an Electron Beam Interacting with a Plasma, *Plasma Phys.* **15**, 826-829 (1973), W. Carr, D. A. Boyd, R. Jones, and M. Seidl.
7. Energy Lost by an Electron Beam in Interaction with a Plasma, *Phys. Lett.* **45A**, 421-422 (1973), D. A. Boyd, W. Carr, R. Jones, and M. Seidl.
8. Transition from Absolute to Convective Instability in a Beam-Plasma System, *Phys. Rev. Lett.* **30**, 1296-1299 (1973), D. A. Boyd, W. Carr, J. Manickam, B. Rosen, and M. Seidl.
9. Saturation of Beam-Plasma Instability in a Lossy Plasma, *Phys. Fluids* **17**, 1638-1639 (1974), W. Carr, R. Jones, D. A. Boyd, J. Manickam, and M. Seidl.
10. Nonlinear Development of Absolute and Convective Instabilities, *Phys. Fluids* **19**, 78-92 (1976), M. Seidl, W. Carr, D. A. Boyd, and R. Jones.
11. Synchrotron Radiation from the ATC Tokamak Plasma, *Phys. Rev. Lett.* **37**, 98-101 (1976), D. A. Boyd, F. J. Stauffer, and A. W. Trivelpiece.
12. An Algorithm to Determine Electron Energy Distributions from Synchrotron Radiation Measurements, *Phys. Lett.* **57A**, 401-403 (1976), F. J. Stauffer, D. A. Boyd, and A. W. Trivelpiece.
13. Experimental Results of the PLT Tokamak, in *Plasma Physics and Controlled Nuclear Fusion Research 1976*, Vol. I, p. 21, IAEA (1977), D. Grove, V. Arunasalam, K. Bol, D. Boyd et al. (33 authors).
14. Synchrotron Emission from Tokamak Plasmas, in *Plasma Physics and Controlled Nuclear Fusion Research 1976*, Vol. I, p. 399, IAEA (1977), D. A. Boyd, C. M. Celata, R. C. Davidson, C. S. Liu, Y. C. Mok, W. R. Rutgers, F. J. Stauffer, and A. W. Trivelpiece.
15. Cyclotron Radiation as a Diagnostic Tool for Tokamak Plasmas, *Nucl. Fusion* **17**, 735 (1977), C. M. Celata and D. A. Boyd.
16. First Measurements of Electron-Cyclotron Emission Spectra from PLT, *Phys. Lett.* **62A**, 498 (1977), W. R. Rutgers and D. A. Boyd.
17. Measurement of Submillimeter Background Emission from Tokamaks, *Far Infrared/Submillimeter Wave Technology and Applications*, Vol. 105-14, S.P.I.E./SPSE (1977), D. A. Boyd, C. M. Celata, and F. J. Stauffer.
18. Determination of Nonneutral Plasma Microstate from Synchrotron Radiation Measurements, *Phys. Lett.* **70A**, 23 (1979), G. D. Tsakiris, D. A. Boyd, D. A. Hammer, A. W. Trivelpiece, and R. C. Davidson.
19. The Electron Energy Distribution of a Mirror Confined Relativistic Plasma Inferred from Synchrotron Radiation Measurements, *Phys. Fluids* **21**, 2050 (1978), G. D. Tsakiris, D. A. Boyd, D. A. Hammer, A. W. Trivelpiece, and R. C. Davidson.
20. The Contribution of Plasma Dielectric Properties to the Cyclotron Radiation Spectrum from a Tokamak Plasma, *Nucl. Fusion* **19**, 423 (1979), C. M. Celata and D. A. Boyd.
21. Fourier Transform Spectral Analysis of the Cyclotron Radiation from the PLT Tokamak, *Infrared Phys.* **18**, 755 (1978), F. J. Stauffer and D. A. Boyd.
22. Energy Balance of the PLT Tokamak, in *Proc. Joint Varenna and Grenoble Int. Symp. on Heating in Toroidal Plasmas*, Grenoble (1978), with H. Hsuan et al.
23. PLT Neutral Beam Heating Results, in *Plasma Physics and Controlled Nuclear Fusion Research (Proc. 7th Int. Conf. Innsbruck 1978)* IAEA-CN-37-C-3, H. Eubank, R. J. Goldston, V. Arunasalam, M. Bitter, K. Bol, D. Boyd et al. (39 authors).
24. Radiation, Impurity Effects, Instability Characteristics, and Transport in Ohmically Heated Plasma in the PLT Tokamak, in *Plasma Physics and Controlled Nuclear Fusion Research (Proc. 7th Int. Conf. Innsbruck 1978)* IAEA-CN-37-A-1, K. Bol, V. Arunasalam, B. Bitter, D. Boyd et al. (35 authors).
25. Neutral-Beam-Heating Results from the Princeton Large Torus, *Phys. Rev. Lett.* **43**, 270 (1979), H. Eubank, R. Goldston, V. Arunasalam, M. Bitter, K. Bol, D. Boyd et al. (38 authors).
26. Density Profiles in Tokamaks from Electron Cyclotron Radiation Spectra, *Int. J. of Infrared and Millimeter Waves* **1**, 45 (1980), D. A. Boyd.

27. Transport Studies in the Princeton Large Torus, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. 8th Int. Conf. Brussels (1980)), W. Stodiek, R. Goldston, N. Sauthoff, V. Arunasalam, C. Barnes, M. Bitter, D. Boyd et al. (49 authors).
28. Fast Wave Ion Cyclotron Heating in the Princeton Large Torus, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. 8th Int. Conf. Brussels (1980)), J. Hosea, D. Boyd, et al. (35 authors).
29. Electron Cyclotron Radiation Measurements on the PLT Tokamak, Phys. Fluids **24**, 719 (1981), G. D. Tait, F. J. Stauffer, and D. A. Boyd.
30. Enhanced Runaway Production by Waves in Plasmas, Comments Plasma Phys. Controlled Fusion **7**, 21 (1982) with C. S. Liu, Z. G. An, Y. C. Lee, L. Muschietti, K. Appert, and J. Vaclavik.
31. Wave Enhancement of Electron Runaway Rate in a Collisional Plasma, Phys. Fluids **25**, 947 (1982) with Z. G. An, C. S. Liu, and Y. C. Lee.
32. Whistler-Mode Electron Cyclotron Emission in a Mirror Plasma, Phys. Rev. Lett. **48**, 93 (1982) with R. F. Ellis and G. D. Tsakiris.
33. Lower Hybrid Heating and Current Drive on PLT, Plasma Physics and Controlled Nuclear Fusion Research (Proc. 9th Int. Conf. Baltimore 1982) with W. Hooke et al. (32 authors).
34. A Density Rise Experiment on PLT, Nucl. Fusion **22**, 1145 (1982), J. D. Strachan, N. Bretz, E. Mazzucato, C. W. Barnes, D. Boyd, S. A. Cohen, J. Hovey, R. Kaita, S. S. Medley, G. Schmidt, G. Tait, and D. Voss.
35. Synchrotron Emission from a Relativistic Loss-Cone Distribution with Application to the ELMO Bumpy-Torus Experiment, Phys. Fluids **26**, 755 (1983), D. Winske and D. A. Boyd.
36. Submillimeter and Millimeter Optical Constants of Liquid Nitrogen, Int. J. of Infrared and Millimeter Waves **4**, 145 (1983), J. Benson, J. Fischer, and D. A. Boyd.
37. Submillimeter and Millimeter Reflection Spectroscopy of Vacuum Compatible Absorbing Materials, Int. J. of Infrared and Millimeter Waves **4**, 591 (1983), J. Fischer, J. Benson, and D. A. Boyd.
38. Synchrotron Emission from Runaway Electron Distributions, Phys. Fluids **26**, 3497 (1983), D. Winske, T. Peter, and D. A. Boyd.
39. Ten-Channel Grating Polychromator for Electron Emission Plasma Diagnostics, Rev. Sci. Instrum. **54**, 1085 (1983), J. Fischer, D. A. Boyd, A. Cavallo, and J. Benson.
40. Confinement Studies of Ohmically Heated Plasmas in TFTR, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. 10th Int. Conf. London 1984), P. Efthimion et al. (64 authors).
41. Divertor and Scoop Limiter Experiments in PDX, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. Int. Conf. London 1984), K. McGuire et al. (49 authors).
42. Adiabatic Toroidal Compression and Free-Expansion Experiments in TFTR, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. 10th Int. Conf. London 1984), G. Tait et al. (76 authors).
43. Neutral-Beam Heating in TFTR - Projections and Initial Results, in Plasma Physics and Controlled Nuclear Fusion Research (Proc. 10th Int. Conf. London 1984), H. Eubank et al. (82 authors).
44. Preliminary Results of Electron Cyclotron Heating Experiments on the PDX Tokamak, Plasma Physics and Controlled Fusion **26**, 265 (1984), H. Hsuan et al. (14 authors).
45. Initial Results from the Scoop Limiter Experiment in PDX, J. Nucl. Materials **121**, 294 (1984), R. Budny et al. (46 authors).
46. Experimental Study of Millimeter Wave Radiation from a Rotating Electron Beam in a Rippled Magnetic Field, Phys. Fluids **28**, 1962 (1985), W. W. Destler, F. M. Aghamir, D. A. Boyd, C. Bekefi, R. E. Shefer, and Y. Z. Yin.
47. Electron Temperature Measurements During Electron Cyclotron Heating on PDX Using a Ten-Channel Grating Polychromator, Nucl. Fusion **25**, 335 (1985), A. Cavallo, H. Hsuan, D. Boyd, B. Grek, D. Johnson, A. Kritz, D. Mikkelsen, B. LeBlanc, and H. Takahashi.
48. Q=1 Magnetohydrodynamic Activity in PLT Studied with Aluminum Impurity Injection as a Diagnostic Tool, Plasma Physics and Controlled Fusion **27**, 229 (1985), A. Compact La Fontaine, M. A. Dubois, A. L. Pacquet, D. Boyd, A. Cavallo, S. Cohen, S. Von Goeler, R. Huba, D. Manus, R. Smith, and R. Wilson.

49. TFTR Michelson Interferometer Electron Cyclotron Emission Diagnostic, Rev. Sci. Instrum. **56**, 925 (1985), F. J. Stauffer, D. A. Boyd, R. C. Cutler, and M. P. McCarthy.
50. Semi-Empirical Models of H-Mode Discharges, Nucl. Fusion **25**, 1555 (1985), C. E. Singer, et al. (26 authors).
51. Mirnov Oscillations as a Diagnostic for the Radial Electric Field in Tokamaks, Comments Plasma Phys. Controlled Fusion **9**, 207 (1985), A. B. Hassam, Bruce D. Scott, J. F. Drake, and D. A. Boyd.
52. $q=2$ Sawteeth and Major Disruptions in Tokamaks, Phys. Fluids **29**, 475 (1986), Robert G. Kleva, J. F. Drake, and D. A. Boyd.
53. Upper Hybrid Emission from a Magnetized Gas Discharge Plasma, Plasma Physics and Controlled Fusion **28**, 327 (1986), R. F. Ellis, G. D. Tsakiris, C. Z. Wang, and D. A. Boyd.
54. New Diagnostic for Spheromaks? What Are the Possibilities?, Rev. Sci. Instrum. **57**, 1962 (1986), D. A. Boyd.
55. ECE Diagnostic for the TARA Tandem Mirror Machine Using a Fast-Scanning Michelson Interferometer, Rev. Sci. Instrum. **57**, 1965 (1986), S. K. Guharay, D. A. Boyd, and R. F. Ellis.
56. Skin Currents and Compound Sawteeth in Tokamaks, Phys. Rev. Lett. **56**, 2477 (1986), Richard E. Denton, J. F. Drake, Robert G. Kleva, and D. A. Boyd.
57. Sawteeth and Temperature Profiles in Tokamaks, Proc. 11th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Kyoto, Japan, 13-20 Nov. 1986, IAEA-CN-47/AV14, D. A. Boyd, R. E. Denton, J. Q. Dong, J. F. Drake, P. N. Guzdar, A. B. Hassam, R. G. Kleva, Y. C. Lee, C. S. Liu, and F. J. Stauffer.
58. Taking the Temperature of a Tokamak, The Physics Teacher **25**, 22 (1987), D. A. Boyd.
59. The Shape of the Electron Temperature Profile in TFTR, Comments Plasma Phys. Controlled Fusion **11**, 63 (1987), D. A. Boyd and F. J. Stauffer.
60. Study of Energetic Electrons During Lower Hybrid Current Drive Experiments at 2.45 GHz from Measurements of Synchrotron Radiation Spectra in the PLT Tokamak, Nucl. Fusion **27**, 2031 (1987), S. K. Guharay and D. A. Boyd.
61. Broadband Measurement of Electron Cyclotron Emission in TFTR Using a Quasioptical Light Collection System and a Polarizing Michelson Interferometer, Rev. Sci. Instrum. **59**, 2139 (1988), F. J. Stauffer and D. A. Boyd et al.
62. Summary of ELMO Bumpy Torus (EBT-S) experiments from 1982 to 1989, S. Hiroe et al. (43 authors), Nucl. Fusion **28**, 2249 (1988).
63. Calculations of Power Deposition and Velocity Distributions during ICRH: Comparison with Experimental Results, Nucl. Fusion **29**, 87 (1989), L.-G. Eriksson, T. Hellsten, D. A. Boyd et al. (18 authors).
64. ^3He - d Fusion Reaction Rate Measurements During ICRH Heating Experiments in JET, Nucl. Fusion **29**, 593 (1989), D. A. Boyd, D. J. Campbell, J. G. Cordey et al. (18 authors).
65. Energetic Electron Parameters in the TARA Axisymmetric End Cell Plasma from Synchrotron Radiation Measurements, Nucl. Fusion **29**, 839 (1989), S. K. Guharay, D. A. Boyd, R. F. Ellis.
66. Latest JET Results and Future Prospects, Proc. 12th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Nice, France, 12-19 Oct. 1988, Vol. 1, JET TEAM (283 authors).
67. The JET H-Mode at High Current and Power Levels, Proc. 12th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Nice, France, 12-19 Oct. 1988, Vol. 1, JET TEAM (283 authors).
68. Heating of Peaked Density Profiles Produced by Pellet Injection in JET, Proc. 12th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Nice, France, 12-19 Oct. 1988, Vol. 1, JET TEAM (283 authors).
69. High Temperature Experiments and Fusion Product Measurements in JET, Proc. 12th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Nice, France, 12-19 Oct. 1988, Vol. 1, JET TEAM (283 authors).
70. Experimental and Theoretical Studies of Ion Cyclotron Heating on JET, Proc. 12th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Nice, France, 12-19 Oct. 1988, Vol. 1, D. F. H. Start, V. P. Bhatnagar, D. A. Boyd et al. (30 authors).
71. Electrical Breakdown at Low Pressures in the Presence of a Weak Magnetic Field, M. J. Alport, J. A. Antoniadis, D. A. Boyd, R. G. Greaves and R. F. Ellis, J. Geophys. Res. **95**, 6145 (1990).

72. Vacuum-Chamber Testing of Space-Exposed SPEAR-I HV Components, John Antoniadis, Michael Alport, Derek Boyd and Richard Ellis, IEEE Trans. Elec. Insul. **25**, 563 (1990).
73. High Temperature L- and H-Mode Confinement in JET, B. Balet, D. A. Boyd, D. J. Campbell,...(25 authors), Nucl. Fusion **30**, 2029 (1990).
74. A 19-Channel Fast Grating Polychromator for ECE Measurements in the MTX Tokamak, S. K. Guharay, D. A. Boyd, R. F. Ellis, F. J. Stauffer, and C. J. Lasnier, Rev. Sci. Instrum. **61**, 3520 (1990).
75. Ionization-Enhanced Currents to an Anode in a Magnetic Field, R. G. Greaves and D. A. Boyd, Phys. Rev. **A 43**, 3015 (1991).
76. Generation of Millimeter Wave Gaussian Beams and their Propagation in a Dielectric Waveguide, Adam Balcum, R. F. Ellis, D. A. Boyd, and Samar Guharay, Int. J. Infrared and Millimeter Waves **13**, 1321 (1992).
77. Measurement of Electron Parallel-momentum Distributions Using Cyclotron Wave Transmission, F. Skiff and D. Boyd, J. A. Colborn, Phys. Fluids B **5**, 2445 (1993)
78. Observation and Analysis of a Two-Parallel-Temperature Electron Tail during Larmer-Hybrid Current-Drive on a Tokamak, J. A. Colborn, M. Porkolab, J. Villasenor, F. Skiff, D. A. Boyd. and R. W. Harvey, Phys. Fluids B **5**, 3622 (1993).
79. Measurements of Electron Dynamics during Lower Hybrid Current Drive, F. Skiff, D. A. Boyd and J. A. Colborn, Plasma Phys. Control Fusion **36**, 1371 (1994)
80. Biased Divertor Performance under LH Current Drive and Heating Conditions on the TdeV Tokamak, R. Decoste et al (45 authors) Proc 15th Int. Conf. on Plasma Phys. and Cont. Nucl. Fusion Research, Seville, Spain, 26 Sept-1 Oct. (1994).
81. ECA Diagnosis of LHCD Electron Distribution Functions in the Tokamak de Varennes, D. Boyd, F. Skiff, S. Gulick, Proc EC-9, 9th Joint Workshop on ECE and ECH, p 255; ed. John Lohr, World Scientific, 1995.
82. Suprathermal electrons in Versator, Tore Supra and TdeV as seen by electron cyclotron absorption diagnostics, D.A. Boyd Plasma Phys. **38** , A237 (1996)
83. A system to measure suprathermal electron distribution functions in toroidal plasmas by electron cyclotron wave absorption, D.A. Boyd, F. skiff, and S. Gulick Rev. Sci. Instrum. **68** 496 (1997)

VII. Book-Chapter:

In *Applied Atomic Collision Physics* Series of Academic Press, "Plasma Diagnostics Using Electron Cyclotron Emission," Academic Press, 1984.

VIII. Invited Papers:

1. Synchrotron Radiation Measurements as a Diagnostic of Tokamak Plasmas, APS Topical Conference on Diagnostics of High Temperature Plasmas, Knoxville, Tenn., Jan. 7-9, 1976.
2. Submillimeter Background Emission for Tokamaks, SPIE Conference on Far Infrared/Submillimeter Wave Technology and Applications, April 18-21, 1977, Reston, VA.
3. A Review of Cyclotron Radiation Measurements on Tokamaks by the Maryland Group, Int. Topical Conference on Synchrotron Radiation and Runaway Electrons in Tokamaks, Jan. 17-19, 1977.
4. Measurement of Synchrotron Radiation in PLT, APS Plasma Physics Division Meeting, Atlanta, GA, Nov. 7-11, 1977.
5. Cyclotron Radiation Diagnostics for Tokamaks, APS Topical Conference on High Temperature Plasma Diagnostics, Santa Fe, New Mexico, March 1-3, 1978.
6. Cyclotron Emission Studies Using Fourier Transform Interferometry, Japan-USA Workshop on Far Infrared Diagnostics, Jan. 28-31, 1980, Cambridge, MA.
7. Some Opinions on the Present State of Electron Cyclotron Emission Diagnostics, Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating, Oxford, England, July 14-15, 1980.
8. Electron Cyclotron Emission Measurements on Tokamaks, Tandem Mirrors, and Bumpy Tori. 1982 International Conference on Plasma Physics, Göteborg, Sweden, June 9-15, 1982.
9. Radiation Transport in Overmoded Waveguides and Quasi-Optical Systems. Third International Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating, Madison, Wisconsin, Sept. 9-11, 1982.

10. Taking the Temperature of a Tokamak, APS Meeting, New York, NY, Jan. 24-26, 1983.
11. Experimental Measurements on Non-Maxwellian Distributions, EC-4 Fourth International Workshop on ECE and ECRH, Rome and Frascati, March 28-30, 1984.
12. "Electron Temperature Profile Shapes," Workshop on Anomalous Transport, University of Maryland, April 17, 1986.
13. Diagnosing Optically Thin Emission: A Review, D. A. Boyd, presented at the 6th Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating, Oxford, England, Sept. 16-17, 1987.
14. Diagnosing Current-Driven Electron Distributions, D. A. Boyd, presented at the 8th Joint Workshop on Electron-Cyclotron Emission and Electron-Cyclotron Resonance Heating, Gut Ising, Germany, October 19-21, 1992.
15. Suprathermal electrons in Versator, Tore Supra and TdeV as seen by electron cyclotron absorption diagnostics, D. A. Boyd, presented at 23rd EPS Conference on Controlled Fusion and Plasma Physics, Kiev, Ukraine, 24 -28 June 1996.

IX. Recent Contributed Papers:

X. Recent Colloquia:

External Examiner:

Swarthmore College, May 21-22, 1982.