

## Curriculum Vitae for Richard Fitzpatrick: September 2008

### Personal Details:

Full Name: Richard Fitzpatrick  
Nationality: U.S.  
Date of Birth: 15th August, 1963  
Marital Status: Married to Faith S. Steinberg, 8th March 1997

### Education:

MA (Physics), University of Cambridge, First class hon. (triple first) (1984).  
D.Phil (Astronomy), University of Sussex, *The Axisymmetric Pulsar Magnetosphere*, supervised by Prof. L. Mestel, FRS (1988).

### Employment:

August 2006 to date: Professor & Research Scientist, Department of Physics & Institute for Fusion Studies, University of Texas at Austin.

September 2000 to August 2006: Associate Professor & Research Scientist, Department of Physics & Institute for Fusion Studies, University of Texas at Austin.

January 1994 to August 2000: Assistant Professor & Research Scientist, Department of Physics & Institute for Fusion Studies, University of Texas at Austin,.

October 1987 to December 1993: Senior Scientific Officer, Culham Laboratory, United Kingdom Atomic Energy Authority.

### Ph.D. Student Supervision:

Edmund P. Yu: "Dynamics of tearing modes in reversed field pinches," 2001.

Andrew Cole: "Forced magnetic reconnection in tokamak plasmas", 2006.

### Service:

Member of Royal Astronomical Society since 1988.

Fellow of American Physical Society since 2003.

Regular reviewer for Physics Review Letters, Physics of Plasmas, Plasma Physics and Controlled Fusion, and Nuclear Fusion.

Regular grant reviewer for the U.S. Office of Fusion Energy Sciences.

### Journal Articles:

1. R. Fitzpatrick, and L. Mestel, *Pulsar electrodynamics-I*, Mon. Not. R. astr. Soc. **232**, 277 (1988).
2. R. Fitzpatrick, and L. Mestel, *Pulsar electrodynamics-II*, Mon. Not. R. astr. Soc. **232**, 303 (1988).
3. C.M. Bishop, R. Fitzpatrick, R.J. Hastie, and J.C. Jackson, *Alpha particle induced magnetoacoustic instability in a thermonuclear plasma*, Plas. Phys. Contrl. Fus. **31**, 431 (1989).
4. R. Fitzpatrick, *On the stability of equilibria with unorthodox  $q(r)$  profiles to the resistive internal kink mode*, Plas. Phys. Contrl. Fus. **31**, 1127 (1989).
5. R. Fitzpatrick, *Linear stability of low mode number tearing modes in the banana collisionality regime*, Phys. Fluids B **1**, 2381 (1989).
6. R. Fitzpatrick, *The effect of trapped particles on the linear stability of long wavelength resistive modes*, Phys. Fluids B **2**, 2636 (1990).
7. R. Fitzpatrick, and T.C. Hender, *The interaction of resonant magnetic perturbations with rotating plasmas*, Phys. Fluids B **3**, 644 (1991).
8. R. Fitzpatrick, C.G. Gimblett, and R.J. Hastie, *On the “ $1\frac{1}{2}$ -D” evolution of tokamak plasmas in the case of large aspect ratio*, Plas. Phys. Contrl. Fus. **34**, 161 (1992).
9. A.W. Morris, P.G. Carolan, R. Fitzpatrick, T.C. Hender, and T.N. Todd, *Driven magnetic reconnection in the COMPASS-C tokamak*, Phys. Fluids B **4**, 413 (1992).
10. R.J. La Haye, R. Fitzpatrick, T.C. Hender, A.W. Morris, J.T. Scoville, and T.N. Todd, *Critical error fields for locked mode instability in tokamaks*, Phys. Fluids B **4**, 2098 (1992).
11. T.C. Hender, R. Fitzpatrick, A.W. Morris, *et al.*, *Effect of resonant magnetic perturbations on COMPASS-C tokamak discharges*, Nucl. Fusion **32**, 2091 (1992).
12. R. Fitzpatrick, *The interaction of tearing modes with external structures in cylindrical geometry*, Nucl. Fusion **33**, 1049 (1993).
13. R. Fitzpatrick, R.J. Hastie, T.J. Martin, and C.M. Roach, *Stability of coupled tearing modes in tokamaks*, Nucl. Fusion **33**, 1533 (1993).
14. R. Fitzpatrick, *Effect of a non uniform resistive wall on the stability of tokamak plasmas*, Phys. Plasmas **1**, 2931 (1994).
15. R. Fitzpatrick, *Stability of coupled tearing and twisting modes in tokamaks*, Phys. Plasmas **1**, 3308 (1994).

16. R. Fitzpatrick, and T.C. Hender, *Effect of a static magnetic perturbation on resistive mode stability in tokamaks*, Phys. Plasmas **1**, 3337 (1994).
17. R. Fitzpatrick, *Helical temperature perturbations associated with tearing modes in tokamak plasmas*, Phys. Plasmas **2**, 825 (1995).
18. R. Fitzpatrick, and A.Y. Aydemir, *Stabilization of the resistive shell mode in tokamaks*, Nucl. Fusion **36**, 11 (1996).
19. R. Fitzpatrick, and T.H. Jensen, *Stabilization of the resistive wall mode using a fake rotating shell*, Phys. Plasmas **3**, 2641 (1996).
20. F.L. Waelbroeck, and R. Fitzpatrick, *Rotation and locking of magnetic islands*, Phys. Rev. Lett. **78**, 1703 (1997).
21. R. Fitzpatrick, and E.P. Yu, *Angular momentum injection into a Penning-Malmberg trap*, Phys. Plasmas **4**, 917 (1997).
22. R. Fitzpatrick, *Feedback stabilization of the resistive shell mode in a tokamak fusion reactor*, Phys. Plasmas **4**, 2519 (1997).
23. T.H. Jensen, and R. Fitzpatrick, *Resistive wall feedback stabilization*, Phys. Plasmas **4**, 2997 (1997).
24. R. Fitzpatrick, *The effect of a partial resistive shell on the magnetohydrodynamical stability of tokamak plasmas*, Phys. Plasmas **4**, 4043 (1997).
25. R. Fitzpatrick, and E.P. Yu, *Optimum design of feedback coils for the control of external modes in tokamaks*, Phys. Plasmas **5**, 2340 (1998).
26. R. Fitzpatrick, *Bifurcated states of a rotating tokamak plasma in the presence of a static error-field*, Phys. Plasmas **5**, 3325 (1998).
27. R. Fitzpatrick, *Formation and locking of the "slinky mode" in reversed field pinches*, Phys. Plasmas **6**, 1168 (1999).
28. R. Fitzpatrick, and E.P. Yu, *Feedback stabilization of resistive shell modes in a reversed field pinch*, Phys. Plasmas **6**, 3536 (1999).
29. R. Fitzpatrick, S.C. Guo, D.J. Den Hartog, and C.C. Hegna, *Effect of a resistive vacuum vessel on dynamo mode rotation in reversed field pinches*, Phys. Plasmas **6**, 3878 (1999).
30. R. Fitzpatrick, and E.P. Yu, *Nonlinear dynamo mode dynamics in reversed field pinches*, Phys. Plasmas **7**, 3610 (2000).
31. R. Fitzpatrick, F. L. Waelbroeck, *Nonlinear dynamics of feedback modulated magnetic islands in toroidal plasmas*, Phys. Plasmas **7**, 4983 (2000).
32. A. Bhattacharjee, R. Fitzpatrick, and Xiaogang Wang, *Comment on "Improved boundary layer analysis of forced magnetic reconnection due to a boundary perturbation"* [Phys. Plasmas **7**, 875 (2000)], Phys. Plasmas **8**, 374 (2001).

33. R. Fitzpatrick, *Conceptual design of an active feedback system for the control of the resistive shell mode in tokamaks*, Phys. Plasmas **8**, 871–884 (2001).
34. R. Fitzpatrick, and E. Rossi, *Control of tearing modes in toroidal fusion experiments using “designer” error-fields*, Phys. Plasmas **8**, 2760 (2001).
35. R. Fitzpatrick, E. Rossi, and E.P. Yu, *Improved evolution equations for magnetic island chains in toroidal pinch plasmas subject to externally applied resonant magnetic perturbations*, Phys. Plasmas **8**, 4489, (2001).
36. R. Fitzpatrick, and P. Zanca, *Phase-locking of tearing modes in the reversed field experiment*, Phys. Plasmas **9**, 2707 (2002).
37. R. Fitzpatrick, *A simple model of the resistive wall mode in tokamaks*, Phys. Plasmas **9**, 3459, (2002)
38. E. Lazzaro, R.J. Buttery, T.C. Hender, P. Zanca, R. Fitzpatrick, M. Bigi, T. Bolzonella, R. Coelho, M. DeBenedetti, S. Nowak, O. Sauter, and M. Stamp, *Error field locked modes thresholds in rotating plasmas, anomalous braking and spin-up*, Phys. Plasmas **9**, 3906, (2002).
39. R. Fitzpatrick, *Plasma parameter scaling of the error-field penetration threshold in tokamaks*, Phys. Plasmas **10**, 1782 (2003).
40. R. Fitzpatrick, *A numerical study of forced magnetic reconnection in the viscous Taylor problem*, Phys. Plasmas **10**, 2304 (2003).
41. R. Fitzpatrick, A. Bhattacharjee, Z.W. Ma, and T. Linde, *Wave driven magnetic reconnection in the Taylor problem*, Phys. Plasmas **10**, 4284 (2003).
42. R. Fitzpatrick, *Scaling of forced magnetic reconnection in the Hall-magnetohydrodynamical Taylor problem*, Phys. Plasmas **11**, 937 (2004).
43. S.A. Sabbagh, J.M. Bialek, R.E. Bell, A.H. Glasser, B.P. LeBlanc, J.E. Menard, F. Paoletti, M.G. Bell, R. Fitzpatrick, E.D. Fredrickson, A.M. Garofalo, D.A. Gates, S.M. Kaye, L.L. Lao, R. Maingi, D. Mueller, G.A. Navratil, D. Stutman, W. Zhu, and the NSTX Reseach Team, *The resistive wall mode and feedback control physics design in NSTX*, Nucl. Fusion **44**, 560 (2004).
44. B.E. Chapman, R. Fitzpatrick, D. Craig, P. Martin, and G. Spizzo, *Observation of tearing mode deceleration and locking due to eddy currents induced in a conducting shell*, Phys. Plasmas **11**, 2156 (2004).
45. M. Shilov, C. Cates, R. James, A. Klein, O. Katsuro-Hopkins, Y. Liu, M.E. Mauel, D.A. Mauer, G.A. Navratil, T.S. Pedersen, N. Stillis, R. Fitzpatrick, and S.F. Paul, *Dynamical plasma response of resistive wall modes to changing external magnetic perturbations*, Phys. Plasmas **11**, 2573 (2004).

46. A. Cole, and R. Fitzpatrick, *Forced magnetic reconnection in the inviscid Taylor problem*, Phys. Plasmas **11**, 3525 (2004).
47. R. Fitzpatrick, *Scaling of forced magnetic reconnection in the Hall-magnetohydrodynamical Taylor problem with arbitrary guide-field*, Phys. Plasmas **11**, 3961 (2004).
48. R. Fitzpatrick, and F. Porcelli, *Collisionless magnetic reconnection with arbitrary guide field*, Phys. Plasmas **11**, 4713 (2004).
49. A. Cole, and R. Fitzpatrick, *Response to "Comment on 'Forced magnetic reconnection in the inviscid Taylor problem'"*, Phys. Plasmas **11**, 5736 (2004).
50. K.W. Madison, P.K. Patel, M. Allen, D. Price, R., Fitzpatrick, and T. Ditmire, *Role of laser-pulse duration in the neutron yield of deuterium cluster targets*, Phys. Rev. A **70**, 053201-1-7 (2004).
51. R. Fitzpatrick, and F.L. Waelbroeck, *Two-fluid magnetic island dynamics in slab geometry. I. Isolated islands*, Phys. Plasmas **12**, 022307 (2005).
52. R. Fitzpatrick, and F.L. Waelbroeck, *Two-fluid magnetic island dynamics in slab geometry. II. Islands interacting with resistive walls or resonant magnetic perturbations*, Phys. Plasmas **12**, 022308 (2005).
53. R. Fitzpatrick, P.G. Watson, and F.L. Waelbroeck, *Two-fluid magnetic island dynamics in slab geometry: Determination of the island phase velocity*, Phys. Plasmas **12**, 082510 (2005).
54. S.C. Prager, J. Adney, A. Almagri, J. Anderson, A. Blair, D.L. Brower, M. Cengher, B.E. Chapman, S. Choi, D. Craig, S. Combs, D.R. Demers, D.J. Den Hartog, B. Deng, W.X. Ding, F. Ebrahimi, D. Ennis, G. Fiksel, R. Fitzpatrick, C. Foust, C.B. Forest, P. Franz, L. Frassinetti, J. Goetz, D. Holly, B. Hudson, M. Kaufman, T. Lovell, L. Marelly, P. Martin, K. McCollam, V.V. Mirnov, P. Nonn, R. O'Connell, S. Oliva, P. Piovesan, I. Predebon, J.S. Sarff, G. Spizzo, V. Svidzinski, M. Thomas, E. Uchimoto, R. White, M. Wyman, *Overview of results in the MST reversed field pinch experiment*, Nucl. Fusion **45**, S276 (2005).
55. R. Fitzpatrick, and F.L. Waelbroeck, *Effect of drift-acoustic waves on magnetic island stability in slab geometry*, Phys. Plasmas **12**, 122511 (2005).
56. A. Cole, and R. Fitzpatrick, *Drift-magnetohydrodynamical model of error-field penetration in tokamak plasmas*, Phys. Plasmas **13**, 032503 (2006).
57. R. Fitzpatrick, and J. Bialek, *Stability of the resistive wall mode in HBT-EP plasmas*, Phys. Plasmas **13**, 072512 (2006).

58. R. Fitzpatrick, F.L. Waelbroeck, and F. Militello, *The influence of the ion polarization current on magnetic island stability in a tokamak plasma*, Phys. Plasmas **13**, 122507 (2006).
59. F.L. Waelbroeck, R. Fitzpatrick, and D. Grasso, *Effect of sheared flow on magnetic islands*, Phys. Plasmas **14**, 022302 (2007).
60. R. Fitzpatrick, *Effect of an error-field on the stability of the resistive wall mode*, Phys. Plasmas **14**, 022505 (2007).
61. R. Fitzpatrick, and F. Porcelli, *Erratum: Collisionless magnetic reconnection with arbitrary guide-field [Phys. Plasmas 11, 4713 (2004)]*, Phys. Plasmas **14**, 049902 (2007).
62. E.J. Strait, A.M. Garofalo, G.L. Jackson, M. Okabayashi, H. Reimerdes, M.S. Chu, R. Fitzpatrick, R.L. Groebner, Y. In, R.J. LaHaye, M.J. Lancot, Y.Q. Liu, G.A. Navratil, W.M. Solomon, H. Takahashi, and the DIII-D Team, *Resistive wall mode stabilization by slow plasma rotation in DIII-D tokamak discharges with balanced neutral beam injection*, Phys. Plasmas **14**, 056101 (2007).
63. R. Fitzpatrick, *Interaction of scrape-off layer currents with magneto-hydrodynamical instabilities in tokamak plasmas*, Phys. Plasmas **14**, 062505 (2007).
64. R. Fitzpatrick, and F.L. Waelbroeck, *Hypersonic drift-tearing magnetic islands in tokamak plasmas*, Phys. Plasmas **14**, 122502 (2007).
65. R. Fitzpatrick, and F.L. Waelbroeck, *Drift-tearing magnetic islands in tokamak plasmas*, Phys. Plasmas **15**, 012502 (2008).
66. R. Fitzpatrick, *Scaling of the peak magnetic reconnection rate in the inviscid Taylor problem*, Phys. Plasmas **15**, 024503 (2008).
67. F. Militello, F.L. Waelbroeck, and R. Fitzpatrick, *Interaction between turbulence and a nonlinear tearing mode in the low beta regime*, Phys. Plasmas **15**, 050701 (2008).

#### Invited Talks:

1. *MHD modes in rotating tokamak plasmas*, 13th International Conference on Plasma Physics and Controlled Nuclear Fusion Research, Washington DC 1990.
2. *Non-linear theories of interacting magnetic islands*, Joint Varenna-Lausanne International Workshop, Varenna, Italy, 1992.
3. *Effect of a non-uniform resistive wall on the stability of tokamak plasmas*, International Sherwood Fusion Theory Conference, Dallas 1994.
4. *Bifurcated states of a rotating tokamak plasma in the presence of a static error-field*, International Sherwood Fusion Theory Conference, Atlanta GA 1998.

5. *Nonlinear dynamics of dynamo modes in reversed field pinches*, Centennial Meeting of American Physical Society, Atlanta GA 1999.
6. *Dynamo mode dynamics in reversed field pinches*, 41st Annual Meeting of American Physical Society Division of Plasma Physics, Seattle WA 1999.
7. *Nonlinear dynamics of feedback modulated magnetic islands*, Innovative Confinement Concept 2000 Meeting, Berkeley CA 2000.
8. *Control of tearing modes via “designer” resonant magnetic perturbations*, International Sherwood Fusion Theory Conference, Santa Fe NM 2001.
9. *Phase locking of tearing modes in reversed field pinches*, International RFP Workshop, Stockholm, Sweden, 2002.
10. *Plasma parameter scaling of the error-field penetration threshold in tokamaks*, 44th Annual Meeting of American Physical Society Division of Plasma Physics, Orlando FL 2002.
11. *Wave driven magnetic reconnection in the Taylor problem*, Interrelation between Plasma Experiments in Laboratory and Space Conference, Whitefish MT 2003.
12. *A new set of reduced 2-D fluid equations*, Conference of Italian Plasma Physics, Florence, Italy, 2004.
13. *A new set of reduced 2-D fluid equations*, Office of Fusion Energy Science Remote Theory Seminar, Austin TX 2004.
14. *Introduction to magnetic island theory*, Center for Multiscale Plasma Dynamics, Plasma Physics Winter School, UCLA CA 2005.
15. *Determining the phase velocity of magnetic islands in two-fluid plasmas*, 9th Plasma Easter Meeting, Turin, Italy, 2005.
16. *External modes and resistive wall modes*, International School of Fusion Reactor Technology, Course on “Global and Local Control of Tokamak Plasmas”, Erice, Sicily, 2005.
17. *Interaction of scrape-off layer currents with magnetohydrodynamical instabilities in tokamak plasmas*, 3rd IAEA Technical Meeting on the Theory of Plasma Instabilities, York, UK, 2007.
18. *Interaction of scrape-off layer currents with magnetohydrodynamical instabilities in tokamak plasmas*, 2007 International Sherwood Fusion Theory Conference, Annapolis MD, 2007.
19. *Introduction to magnetic island theory*, Abdus Salam International Center for Theoretical Physics, 2007 Summer College on Plasma Physics, Trieste, Italy, 2007.

**Books:**

1. *Maxwell's Equations and the Principles of Electromagnetism* (Infinity Science Press, 2008) ISBN: 978-1934015209.

A textbook aimed at upper-division physics majors.

2. *Euclid's Elements* (Lulu, 2007) ISBN 978-0615179841.

An edition of Euclid's Elements of Geometry consisting of the definitive Greek text of J.L. Heiberg (1883-1885) accompanied by a modern English translation and a Greek-English lexicon.